cinefex
number 44
$5.95
Canada - $7.50

cinefex

...the journal of cinematic illusions

editor & publisher
Don Shay

associate editor
Jody Duncan

contributing editor
Janine Pourroy

advertising representative
Bill Lindsay

circulation manager
Ann Webb

CINEFEX 44 — November 1990. Published quarterly at P.O. Box 20027, Riverside, California 92516. Subscriptions (U.S.): four issues - $20; eight issues - $32; twelve issues - $46. Return postage must accompany all unsolicited manuscripts, photos or other materials. Printed by Valley Printers, Riverside, California; color separations by Select Color, Ontario, California. Contents copyright © 1990 by Don Shay. All rights reserved. Reproduction in whole or in part without written permission is prohibited.

'Ghost' Stories 4

For director Jerry Zucker, *Ghost* was a vast departure from the broader-than-broad comedies that had made him a bankable commodity in Hollywood. Selecting a deeply romantic supernatural thriller for his first solo outing, Zucker surrounded himself with a cadre of top-notch visual effects artisans and created a stupendous boxoffice hit. Contributing ghostly pass-throughs and otherworldly spirits — even a representation of heaven — were effects teams from Industrial Light and Magic, Available Light and Boss Film Corporation. *Article by Jody Duncan.*

Crimestoppers Textbook 22

For nearly six decades, Dick Tracy has been a household name. But it was not until producer-director Warren Beatty tackled a big-budget ode to his childhood hero that the saga of *Dick Tracy* — complete with its bizarre villains and ultra-stylized settings — was fully realized on film. Aided by makeup artists John Caglione, Jr. and Doug Drexler and by miniatures and matte paintings from the Buena Vista Visual Effects Group, Beatty imbued his production with a comic strip look all its own. *Article by Glenn Campbell.*

Playing with Fire 52

Captivated by childhood recollections of *A Guy Named Joe,* producer-director Steven Spielberg launched into *Always* — his own remake in which the characters were contemporized from World War II bomber pilots to modern-day aerial firefighters. Physical effects supervisor Mike Wood staged massive conflagrations on location and on studio soundstages, while Industrial Light and Magic used large-scale miniatures shot in-camera to produce the really expansive scenes requiring aircraft to barnstorm over blazing forest fires. *Article by Kevin Martin.*

FRONT COVER — Big Boy Caprice rules the crime syndicate in *Dick Tracy.*
Al Yackey struggles to control his burning aircraft in *Always* — BACK COVER.

‘GHOST’ STORIES

article by
Jody Duncan

Throughout the year-long production of Ghost — the Howard W. Koch production for Paramount that opened to terrific response at the height of the summer film glut — director Jerry Zucker emphatically asserted that Ghost was not an ‘effects picture.’ It was a philosophy he stubbornly held onto, in spite of the fact that the film ultimately enlisted the services of not one, but three major effects houses, as well as the contributions of several smaller, specialized facilities.

What had initially attracted Zucker to the script by Bruce Joel Rubin was its very human approach to the fantasy realm. Basically a love story, the screenplay dealt with the relationship between corporate banker Sam Wheat (Patrick Swayze) and artist Molly Jensen (Demi Moore). Deeply in love, their lives are shattered when Sam is suddenly and tragically killed during an apparently random mugging on a dark New York street. But the story is not over for Sam, who finds himself in a strange spiritual limbo — ever in Molly’s presence, yet unable to communicate with her. His confusion turns to desperation when he discovers that his death was actually orchestrated by his friend and coworker Carl Bruner (Tony Goldwyn) and that Molly’s life is also now in danger. A chance encounter with medium Oda Mae Brown (Whoopi Goldberg) — a charlatan none too pleased to discover her powers are legitimate when she begins to hear Sam’s voice — provides Sam with his only link to the physical world. The rest of the tale unfolds like a murder mystery, with Sam stalking his killers, exacting his revenge and saying a last goodbye to his beloved Molly before finally ascending into heaven.

It was the achingly romantic aspects of the story that intrigued Zucker, far more than the opportunity for razzle-dazzle special effects inherent in depicting the spiritual afterworld. “I liked the themes and the characters,” said Zucker, “and the idea that it was written by somebody who takes the spiritual world seriously, but not himself. I felt that the film reflected that. Underneath it all, the script was saying that maybe we all do have spirits or souls which exist after the body dies; maybe we are accountable; maybe there is some purpose in life other than business and sex and money and physical possessions. But it said all of that without being preachy. So I had a very positive reaction to the script from the beginning — and then, after spending time with Bruce Rubin, I really became enthusiastic.”

Rubin himself was less than enthusiastic — at least initially. In fact, when confronted with the news that Jerry Zucker — one third of the team that had directed both Airplane! and The Naked Gun — had been chosen by Paramount to direct the film, the writer, by his own admission, broke down and cried. It was an understandable response considering the fact that Zucker had never directed solo before, was known only for outlandishly comic films and knew absolutely nothing about special effects. Soon, however, Rubin became convinced that his baby was in more than capable hands. “We’re great friends now,” Zucker asserted, “but his first response was just: ‘Oh my God! The guy who did Airplane!’ But then we got together and collaborated very closely. We went through nineteen more drafts of the script after I became involved, adding a bit more humor to it and doing some restructuring.”

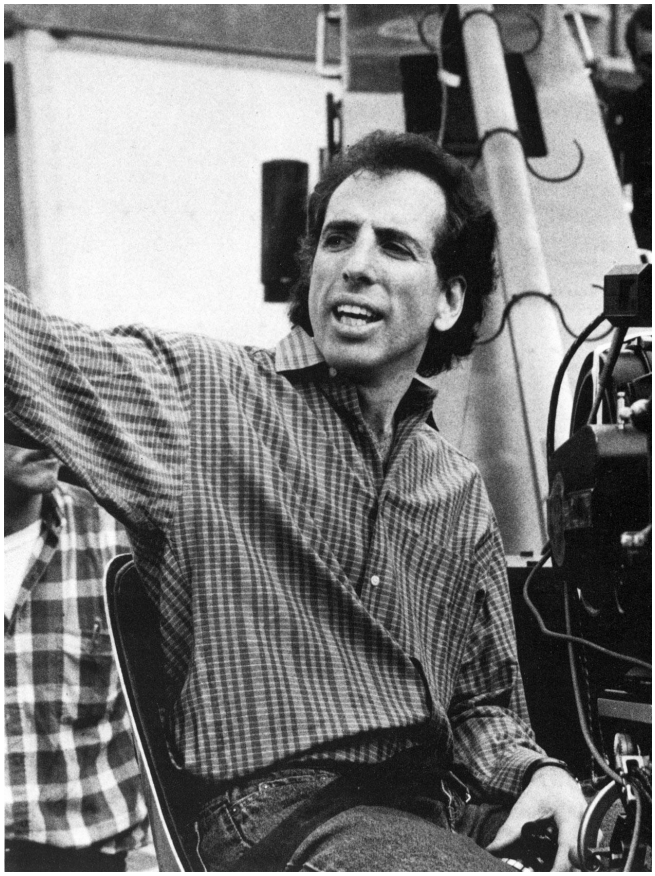
For both aesthetic and economic reasons, Zucker’s first major concern in revising the script was to substantially reduce the number of effects shots. “I kept reading and rereading the script, asking myself: ‘Is this shot really necessary? Can the movie exist without this effects shot?’ If it could, I cut it out. In other cases, I tried to think of ways to accomplish the same thing without having to actually show the effect. For instance, there is a shot of Sam entering the seance room which, as scripted, had him passing through the door. I changed it so that the door was already open and he could just walk through it. Anytime I could get by without an effect, I did. I thought it was important to emphasize the fact that it was a drama and a love story. I wanted the audience to invest in the characters and believe the whole premise. I felt we would be in trouble if people left the theater saying: ‘Boy, those were nifty effects. How did they do that?”‘

After cutting the effects to a still formidable one hundred shots, Zucker engaged veteran effects supervisor Harrison El-lenshaw as technical consultant and began shopping around for an effects facility, talking to virtually every big name in visual effects on both coasts. Based on some test artwork that he found particularly interesting, Zucker first settled on John Van Vliet and Katherine Kean of Available Light. “I felt that John and Kathy understood what I was looking for and what the picture was about. And I felt comfortable with them, which was important since when I started this project I knew nothing at all about special effects. I was completely in the dark.”

Available Light began by doing tests for all of the proposed effects, in particular the shadowy hooded creatures — dubbed ‘clickers’ because of the characteristic clicking sounds that accompany their arrival — which were to act as spirit escorts to hell. Before long, it became apparent that the clickers would require an intensive and full-time effort. “The clickers turned out to be incredibly involved,” Zucker recalled, “and we were starting to run behind. Also our release date was being moved up. Plus I did not want to preview the movie with ‘scene missing’ cards every time there was an effects shot — I wanted at least something for every shot. So I decided we needed a bigger effects team working on everything.” Ultimately, effects production supervisor Laura Buff was hired to orchestrate and coordinate the overall campaign and the workload was divided among three houses — Available Light would concentrate on the clickers, as well as the ‘good spirits’ represented as flickering spheres of light; Industrial Light and Magic would take on the pass-through effects requiring ghosts to move through walls and other solid objects; and Boss Film Corporation would be responsible for the entire end sequence in which the ghost Sam is revealed to Molly before ascending to heaven.

The fifty-some pass-through effects — overseen by ILM visual effects supervisor Bruce Nicholson — were, in Zucker's mind, crucial to the audience's acceptance of the various spirits in the film. Because of that, the director hoped to improve on the traditional split-screen and rotoscoping techniques that had been used in previous ghost films. "Before we started on the film, I looked at a number of effects movies — such as Poltergeist II — where pass-throughs had been done. Some of them were quite good, but generally the effect had a two-dimensional look to it like two pieces of paper going through each other. That bothered me a bit because it did not have an emotional impact, the feel of someone going through another person or object. It looked like a movie trick to me. So a lot of the work ILM did was to experiment with other elements to try and give the effect three dimensions."

Because ILM was brought onto the project well into production — when the time crunch for completing all of the effects was frighteningly apparent — the celebrated effects team did not have its customary input in the preproduction phase. "It was an unusual assignment for us in that sense," stated Nicholson. "When we came on the show, we basically said 'yes' one day and the next day I was shooting plates. So there was not a lot of time to prepare. But I had to have some concepts, some way of analyzing how to go about approaching the work. So, after talking to Jerry Zucker, Doug Chiang — our effects art director — did a whole body of artwork."



Jerry Zucker calls the shots on Ghost — his first solo directorial outing — which handily beat out all of its big-budget competitors to become the highest grossing release of the summer. Though determined to make a supernatural love story and not a visual effects extravaganza, Zucker nonetheless engaged three major firms to provide the hundred-plus optical shots required for the film — Industrial Light and Magic for the ghostly pass-through effects, Available Light for the good spirits and dark spirits and Boss Film Corporation for the climactic transcendence into heaven.

Achieving a suitable pass-through effect was substantially complicated by a conceptual suggestion made by editor Walter Murch. To avoid the 'cutout' look characteristic of pass-through effects in earlier films, it was Murch's idea that as a ghost character passed through a surface, the color and texture of that surface would 'bleed' onto his body — as if part of the surface itself was being absorbed through some osmotic process. "It was like putting a napkin in coffee," explained Nicholson. "That was the effect they were looking for. It was a very difficult concept to put on film. We spent a lot of research and development time trying to get something that looked organic and had that feeling of absorption. So it was not just a matter of having someone walk through a surface — we also had these extra effects to worry about."

Doug Chiang produced several quick renderings depicting possible bleed effects. “We also did a whole series of tests,” said Chiang. “One of them involved coating an arm in vaseline and then dipping it into white paint just to see how it trickled off when we pulled the arm out. That was a pretty interesting effect. It was very animated and it looked like the material was interactive with the arm. But the problem was how to translate that onto film? That was not really our concern, however. At this point, we were just trying to come up with an interesting look. It was up to Bruce to figure out how to do it.”

Once the concepts for the pass-through and bleed effects were approved, Nicholson began determining how each one might be achieved. Because of the variety of the pass-through shots, it soon became evident that a number of different techniques — from traditional rotoscoping to motion control split-screen photography to bluescreen and even green-screen photography — would have to be implemented. “There were a lot of things that determined which technique we would use — how much camera movement was in the shot, how much action was in the overall scene and what angle we were shooting from. The angle became very important. If a character was walking through a wall and the camera was positioned straight on his back, that would be a lot different than if it was shot at a raking angle. The contour of how he would disappear and reappear would be quite different. Also, the speed at which the character was moving affected the shot. So we had to come up with a number of different approaches to the pass-throughs.”

One approach was to shoot a plate of the background — the wall or door that the character was to pass through — then shoot the character against a bluescreen and combine the two optically. Before they could be composited, however, the two basic elements were delivered to the animation department where rotoscope mattes were generated that would ‘cut off the part of the character that was going through the surface. Another approach was used when the character could not be shot against bluescreen. “If the ghost needed to pass through a vase on a table — or a can or a bottle cap — the production crew would film two takes,” said animation supervisor Charles Clava-detscher. “The first take would be shot with the object, but no actor. On the second take, they would remove the object and shoot just the actor. Then we could use standard split-screen techniques to put the ghost together with the object that he appeared to pass through on the other side of the split. As the actor crossed the split, the rotoscope department — headed by Tom Bertino — had to roto his body wherever he crossed to keep him from disappearing at the split line. The same roto mattes also contained the bleed, so it did not spill outside the ghost’s body into the surroundings. Additional pass-through mattes were then needed to cut off his image so that he seemed to disappear as he touched the object.” Thirty to forty percent of the pass-throughs in the film were split-screen composites.

The animators’ job was made easier by reference lighting that was included in the plate photography. “When Adam Greenberg — the director of photography — was lighting these plates, I asked him to put in a raking light from the side,” Nicholson explained. “We would create a slit of light using barn doors or flags so that when a ghost character walked into the plane of where the wall or door had been, there would be a narrow line traced along his body. Then when it came time to do the roto work, the animators had a good reference as to where the plane of the wall was, which helped them do their cutoff mattes. We spent a lot of time on the set positioning that slit of light so that it would be as accurate as we could get it. We also

used video playback for virtually every shot. The camera lineup in most cases was critical and we used video as a way to determine if the position and action were right."

Because Zucker had stressed that he wanted the cut-off of the character as he passed through an object to be soft-edged rather than hard, the optical department found compositing of the pass-through shots to be particularly challenging. "In order to keep a sense of interaction with the object," explained optical supervisor Stuart Robertson, "we were trying to keep the contour of the cutoff line as soft as possible. So it was not a simple, hard cutoff — it sort of feathered into the object a little bit. When we were making our mattes for the bluescreen process — say of an arm going through a door — we would cut it off at a certain point and then make a second exposure of the garbage matte which let us fill in the area of the arm that we were getting rid of. Then we would throw in a certain degree of softness on our printer. We also wanted to make our bluescreen intermatte with the same kind of arrangement, but to do that we had to use a heavier exposure on our burn-in to force the soft edge a little further down the arm. Then when we pulled a positive print from the intermatte — if God was on our side — we would come out with a sharp edge that would blend off a little bit into the soft edge. There is no formula that would make this work one hundred percent of the time. We just had to make our elements in each case, push them in, shoot them, see what we got, then go back — it was a real series of approximations."

The first pass-through effect appears early in the film. A shot is heard as Sam struggles with the armed mugger. Frightened, the mugger runs away and Sam is seen chasing after him down the street. From all appearances, Sam has escaped injury in the attack; but when he returns to Molly, he finds her tearfully cradling his lifeless body. Incredulous, Sam reaches out to touch the corpse that had once been himself and is appalled to discover that his ghost hand passes right through his own face. "Both Sams were shot bluescreen," noted Nicholson, "and the background was a New York street miniature that was done at ILM. The shot begins with the ghost Sam standing there, looking down, and we start on his face and then follow him down to the dead character. The actual film elements were locked off. We shot them with our Vistavision camera mounted sideways and then later did an optical scan on the shot to simulate camera movement. John Alexander programmed the optical move and the end result looks very much like a live-action boom down."

Working from photographs of the actual street location, modelshop supervisor Lorne Peterson began building a one-sixth-scale setting that was about eight feet square. "The alleyway miniature had industrial doors and ramps and graffiti-covered brick," Peterson said, "plus a lot of trash cans and lampposts. We made it out of a relatively new material called gatorfoam which is like foamcore except the outer surfaces are low-grade melamine instead of paper — just a really thin laminate. The advantage to gatorfoam is that it does not bend or warp and stage lights do not affect it. We built the model very quickly — in about eight man-days. I don't think Jerry Zucker realized that we could do it that quickly, because when he saw footage of the model he said, 'When you do the model, I want it to look just like this plate.' He didn't know that what he was looking at was the model!"

Motion control was utilized for shots of the spirit Sam — who has just discovered that Carl Bruner was responsible for his murder — going into a rage and swinging wildly at his oblivious

former friend on a New York street. “We shot the scene at night in Brooklyn,” Nicholson recalled. “We had to stage everything very carefully and shoot the characters separately because Sam’s fists had to pass through Carl. Adam Greenberg had set up beautiful lighting for the night shot. First there was a pass on Sam, then a second pass on Carl. A moving vertical split was used to combine them. A horizontal split was also needed to put two passing trains on an overhead trestle. It was a tough shot because the dolly was moving so fast that the motors on the field recorder would fail — they just could not keep up with ghost Sam. So we had to slow down the action a bit. That was the most challenging motion control shot.”

Because of the fast-paced action, Nicholson was concerned that the shots of Sam’s fist passing ineffectually through Carl’s body would not read on film. “We had shots where Sam is punching Carl and the punch goes through in one frame — there was no way you could see it. So I suggested to Jerry that in those cases we create a trailing blur — a blur that would occur after the pass-through to tell the audience that a pass-through has just happened. The blur effect was shot on the animation stand, using streak photography with artwork. Charlie Canfield was responsible for generating most of that.”

Walking home late one night, lovers Sam Wheat and Molly Jensen are attacked by a mugger. In the scuffle, Sam is shot and killed — though he is unaware of it until he returns from chasing off the hoodlum to find Molly tearfully cradling his corpse. When the reluctant ghost attempts to confirm by touch what his eyes are telling him, his noncorporeal hand passes through his now lifeless physical form. ILM accomplished the effect by shooting separate bluescreen elements of actor Patrick Swayze and then compositing them over a miniature setting with articulate rotoscope mattes to effect the actual pass-through.

A much simpler pass-through technique sufficed for a shot during Sam’s funeral in which a woman spirit walks serenely through the cemetery and disappears into her own tombstone. Because the tombstone was a stationary object, Nicholson was able to use rotoscoping to effect the pass-through. “First we shot the woman without the tombstone in place. Then we put in the tombstone — which was made of foam — and shot it. Since the tombstone did not move, all we had to do was roto one frame of the shot. The pass-through was accomplished with articulate mattes and cross dissolves.” Yet another technique was required for scenes of Sam passing through small surfaces — as when he passes through scaffolding bars in the loft apartment. “We could not do a bleed on the bars. It would have been too small and too quick to be seen on Patrick. So we decided to just show that as a soft cutoff, revealing him passing through. If he were walking through a bar, certain parts of his body would come through before

As Sam stands bewildered in the alleyway, a heavenly shaft of light descends to collect his soul, but the unready ghost shakes it off and remains behind in the physical world. Available Light

others. What made it complicated for Tom Bertino was trying to figure out which part of the body would show up first."

employed layered animation effects to achieve the illusion.

Near the end of the film, Oda Mae briefly surrenders her body to Sam's spirit so that he can share a few moments with Molly in physical form. The transference shot required the use of green-screen photography — a seldom used technique that became necessary because the all-blue costume worn by Whoopi Goldberg made more conventional bluescreen photography unworkable. "We see the transformation of Oda Mae becoming Sam in one shot," said Nicholson, "so I had to matte Whoopi Goldberg into the shot. It was kind of a cross-dissolve — we called it 'ghost-mix' and it was like a superimposition, but it was partially matted. We used the technique in this shot so that you could see one character emerging from the other. I had never done green-screen on film. I had done it on video — which works well — but never on film. So we tested it and we got it to a point where it just barely worked — and then we held our breath and went ahead with it. You cannot get a transmission green screen — there's no such thing — so I used the same technique we have used in video, which is to paint a flat with Ultimatte green and then illuminate it with green-gelled tungsten lights. It worked out all right, but I don't recommend it. One green-screen shot was plenty."

Though the bluescreen and split-screen techniques employed for the pass-through effects were, for the most part, an improvement over simple rotoscoping, it was the osmotic bleed conceived by Walter Murch that gave the effects the interactive quality Zucker was seeking. These bleed elements were generated by the animation department via two different techniques — traditional hand animation and motion control. "Traditional animation usually involved only one step," said Clavadetscher. "The film would be given to the animator who then plotted the motion of the bleed on a frame-by-frame basis. That technique was good for shots where the bleed needed to wrap around many contours and complex shapes but still look like it was traveling at a constant rate over the surface. It allowed a lot of detail such as small 'islands' of bleed to form and grow, and it further allowed pools of natural color to be left behind the main wave of the bleed as it moved forward. It also allowed the final bleed shape to be seen at a glance on the artist's drawings.

"Using motion control was nearly the opposite. Imagine a side shot of a ghost putting his arm into a door and then pulling it out. The bleed will need to travel up the arm, into his upper body and then retreat. With motion control techniques, a program is created that matches the motion of his arm. If we put a piece of art on the table and shot it with this program alone, the bleed would move with the arm but stay in one spot on his arm. The next step is to add a channel of movement that will cause the bleed to travel up the arm as the character moves. This is a basic technique of motion control — get a foundation program and then add on top of it. It is a lot easier to do it in additive steps than it is to try and plot the bleed as one program — and it allows you to quickly try many variations. By changing the variables, we can get one bleed program that surges and then slows, one that progresses at a constant rate and maybe another with many small surges and ebbs in it. Since these variations are just added to the foundation program — which matches the arm movements — we could try more than a dozen variations in a single day. All would be different and easily fine-tuned by taking just the bleed advancement

program, adjusting it and recombining it with the arm match move. On Ghost, once we got the basic bleed advancement program, it was stored as a ‘back-wave’ and then as many as twenty more programs were added on top of it to break up and move the leading edge into pseudopod-type fingers. Each pulsing finger was a separate pass on a piece of oblong art that was moved and twisted by yet another program. These finger programs were added to the backwave program so their motion was connected. Then all of the passes of fingers and back-wave were exposed onto one piece of film and sent to optical.”

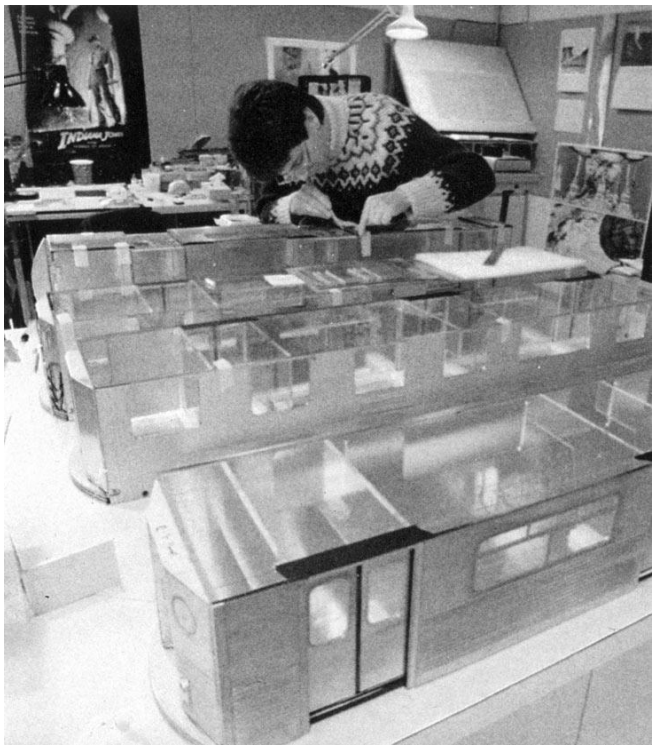
Clavadetscher found advantages and disadvantages to both the hand animation and motion control techniques. “The drawback to hand animation is that the longer the shot is the more time it takes to complete it — and small corrections can sometimes mean having to redo all of the animation. Motion control is impractical if you want to get small pools and islands of color, or if you want to wrap around complex contours, but its speed and ease at making changes is great for long shots that would take forever to do by hand. In addition, motion control can be used to easily plot and add more and more layers of complexity since the program can be dealt with in small sections. It can also be used to add motion blur and to track objects using match-moving techniques. But since motion control requires many passes all burned together, it cannot be seen at a glance like an animator’s drawing.”

For the animators, the toughest aspect of the pass-through and bleed effects was coordinating them all together. “At first we tried animating without really watching the cut-offs and the bleeds together, but we found that they had to be dealt with in a much more deliberate way than you would initially think. For instance, if someone was walking away from camera into a wall, the cutoff would wrap around his back at a certain rate; but if we had the bleed go at the same rate, it did not look right — it almost looked like step-printing. Consequently, we had to speed up or slow down the bleed to smooth the effect out and sustain the impression of two distinct things happening.”

Some of the most spectacular pass-through effects take place in the sequence in which Sam meets up with the ‘subway ghost’ — a bad-tempered spirit who has mastered the technique of affecting the physical world through mind control. Determined to learn the technique himself—so that he will be better able to protect Molly — Sam searches for the subway ghost, leaping from one moving car to another. Bluescreen elements of Patrick Swayze leaping off a trampoline were shot first, then composited into footage of a highly-detailed subway setting built by Lorne Peterson and his crew.

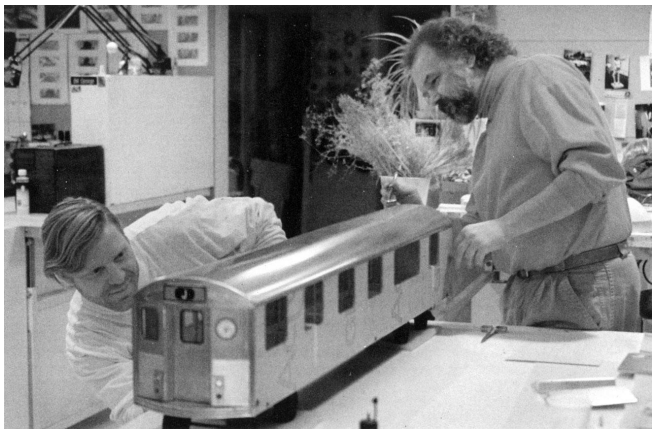
Patrick Swayze was photographed making his leaps in front of an eighteen-by-twenty-four-foot bluescreen. “He almost went off the top of it,” said Nicholson. “Being a dancer and as athletic as he is, Patrick is incredibly good at putting himself in the physical space you want him in. We would do a take and we would see it on video, and I would say, ‘Now, can you just move it over here a little bit?’ It was no problem — he would just go and do it. We shot the leap high-speed and then we had to match that camera angle for the subway miniature. This necessitated a mirror arrangement to simulate the low angle from which the plate was shot. It was a really dynamic shot.”

The bluescreen element would be composited into footage of the twelfth-scale subway miniature built by the model crew. “The subway model was fifty-feet long and included six functioning subway cars,” said Peterson. “We took some drawings and photographs of the trains they had used in New York and then just made laser-cut parts out of plastic. That approach was ideal because there were six cars and thus a lot of repeating parts. We were able to assemble the trains almost like kits.” Thin sheet aluminum was brushed with scouring pads to give it the look of stainless steel, then corrugated to match the pattern on actual subway trains. Vacuform plastic was used for the tops of the cars. “For some of the shots, the camera was going to be very close to the train as it went past, so all of this detail was very important. Brushed aluminum looks genuine. No matter how good a silver paint job you do on plastic, you just cannot get the same look that metal has.” Wheels were made from molds used to produce wheels for the rail-riding DeLorean in Back to the Future III — which, by fortunate coincidence, were exactly the right size. Each of the completed cars was approximately four feet long, ten inches wide and a foot tall.

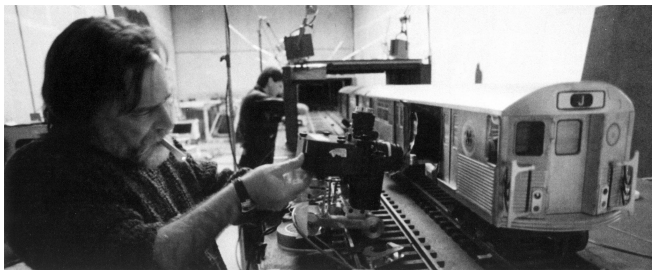


Sam soon discovers that his death was not a random street crime, but murder, and that Molly is also in danger. Determined to make contact with her, he seeks out a subway ghost who is able to physically affect the world around him. Miniature work was required for some of the subway scenes. In the ILM model shop, Alan Peterson assembles sheets of laser-cut acrylic plastic into individual subway cars.

Aluminum track — purchased from Little Engines in Southern California, which supplies private railroad modelmakers — was laid down in two parallel J-shaped curves. Subway tunnel sections were made in four-foot-long modular units that could be popped on and off depending on the requirements of a specific shot. “Real New York subways have a little recess every fifty feet or so with a light bulb in it. That was fortunate because it allowed us to leave a gap between every module where we could bring in light from the side. We used miniature light bulbs left over from the tunnel chase in Indiana Jones and the Temple of Doom — little hand-blown, half-inch-tall light bulbs. There was a whole line of them in the tunnel and that helped maintain scale and perspective. We also made a four-by-six grated ceiling that was laser-etched — and light was brought in through the grating as if it were coming from the street or something. We needed as many ways as possible to bring light in.” For a final touch of realism, Peterson spritzed down the tunnel walls with alcohol to simulate water dripping through. “I used alcohol because there is always a scale problem with real water. I wet down the tops of the tracks, the tops of the ties and the walls with the alcohol and it made a big difference in how the set looked. There would be reflections as if what we were looking at was an oily track or that kind of thing.”



Thin sheet aluminum — brushed with scouring pads to simulate stainless steel — was attached to the outer surfaces. Brian Gernand and shop supervisor Lorne Peterson affix a vacuform plastic roof section.



The subway cars were propelled via cables through modular tunnel sections. In preparation for a tight shot within the tunnel environment, assistant cameraman Bob Hill loads a film magazine onto a still camera modified for motion picture work.

The model subway trains were propelled by cable. “We had steel-braided cable attached to a capstan at each end of the track. The capstans were attached to stepper motors. The subway cars moved quite slowly — four feet in ten seconds. One of the problems was that when you have capstans from either end, one gets smaller as the other one gets bigger, and this causes a slight change of speed which produces a bit of a surge — a kind of pulse effect. But it turned out that it looked more genuine that way, because the real trains have a certain amount of surge to them also.”

Effects cameraman Marty Rosenberg was responsible for shooting plates of the subway model which would then be composited with the bluescreen elements of Patrick Swayze. For one shot depicting Sam’s head being pushed through the wall of the train as another train approaches, Nicholson resurrected the mothballed Nikonflex — a Nikon still camera modified for motion control use specifically to shoot the mine tunnel chase in Indiana Jones and the Temple of Doom. “I thought this was a very good sequence for the Nikonflex, because it was similar to the

one in Indiana Jones — an enclosed environment that required a small camera to get right in between these two subway cars. The Nikonflex had been sitting around for a couple of years, so we got it out and dusted it off and steady-tested it — and it looked terrible. Lanny Cermak worked on it for about three weeks, and by the time we were ready to shoot it was steady enough. We positioned it right in between the two tracks. We also used a perspective-correction lens to get us in a little bit tighter on the subway car. Marty programmed everything with our motion master system — the subway cars as well as the camera movement."

Well before ILM was even involved in the project, John Van Vliet and Katherine Kean of Available Light had begun doing tests for the shadowy clickers that come to collect evil souls and drag them off to hell. Both Carl Bruner and Willie Lopez (Rick Aviles) — a thug enlisted by Carl to murder Sam — fall victim to the dark forces upon their respective deaths. Conceiving the clickers was a long and involved process, requiring months of testing and experimentation. "It was the old story of 'Show me something and I'll tell you if it is close,"' said Van Vliet. "We did a lot of sketches trying to develop a look for the clickers and eventually we came up with the 'Gestapo ghosts' — which are a combination of go-motion and stop-motion. As a test, we made an eighteen-inch model of the ghost and put it on our Oxberry and did a motion control move on it. We also did a little bit of stop-motion on the armature. We showed that test to Jerry and the producers and they really liked it."

After the first rough test, Kean and Van Vliet began experimenting with different frame rates. "We went into it with the idea that time lies to us and there are different things happening outside our normal 'frame rates' of perception," explained Van Vliet. "Our eyes perceive about sixty frames per second as being normal; but if you look at an exposure of a waterfall that is maybe five seconds in duration, instead of a waterfall what you see is a smooth creamy-looking form flowing down. So we started looking at what things would look like at extremely slow frame rates and discovered that there were all kinds of neat things going on that are just not visible to the human eye. At eight seconds per frame, for example, we found some interesting effects with the flowing robe we had put on the puppet. We had big fans that were blowing the fabric all over, so for a couple of frames the robe might be in the same area and we would get this creamy flow off of it — and then it would suddenly be someplace else. It was frenetic, and the effect it created was like some kind of energy all around the basic shape of the puppet."

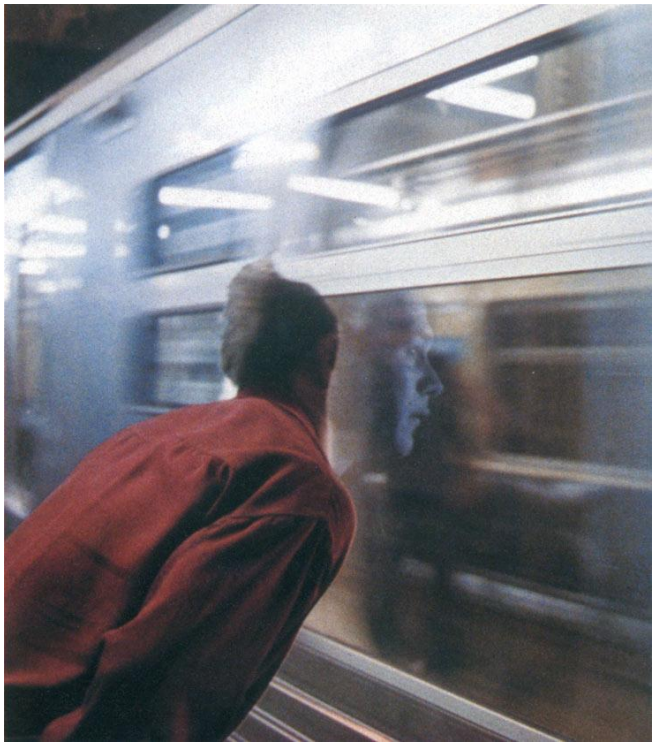
Although the effect was intriguing, the motion of the floppy fabric did not scale properly on the eighteen-inch puppet. Further testing convinced Kean and Van Vliet that the approach would work, but only with a man-size puppet. "We realized that the whole idea was ridiculous," said Van Vliet, "because it would cost fifty thousand dollars to build a puppet at full human scale, and even then it would never look right because it would be too hard to articulate. There had to be another way. So we thought we might as well try putting a guy in a suit and see what we could get. We started with a black bodysuit and built a white robe over it. The final figure would, of course, be black — but we decided it would be a lot easier to shoot with a white figure on a black stage and reverse that than it would be to try and white out an entire environment for a black figure. Skeletal hands were painted onto the black bodysuit and then we started with just a few shreds of white fabric and kept adding on anything that would catch the wind from

the fans. Eventually it was a huge flowing outfit. For the face we used a mask with a big oversized hood coming up over it.”

In a territorial dispute with the subway ghost Sam is thrust through the wall of a subway car and into the path of an onrushing train. The miniature subway was used to produce background plates for the bluescreen live-action.

Unfamiliar with the limitations of his immaterial existence, Sam tentatively pushes his hand through a door. To give the effect more character, animation and optical elements were introduced to make the color and texture of the penetrated surface bleed onto his arm.

Now reasonably assured of his ability to pass through solid objects, Sam leaps through the door.



Looking for the subway ghost, Sam stands on the station platform and peers into a passing train.

Having determined that the only feasible approach was to stop-motion animate a human being, the challenge then became to find a human being capable of positioning his body accurately and incrementally and holding it for painfully long exposure times. “It’s not something just anybody can pick up and learn,” stated Van Vliet, “but I knew exactly who to call. I thought to myself, There is one guy on the planet who can do this — and his name is Mike Jittlov.‘“ As producer, director, writer and star of The Wizard of Speed and Time — plus other dazzling short subjects featuring animation in all its forms — Jittlov was known in the animation community as a cult artist who had successfully been able to use himself as a stop-motion subject. “I had followed Mike’s stuff for years and loved it. When the clicker concept gelled and we knew what we were going to try, it took me about ten seconds to pull out his phone number and get him over here. We had to talk him into it — he did not want to be an evil spirit. But when we explained that he was not really an evil spirit, but was more like a chauffeur to hell, he went along with the idea and agreed to do it.”

Patrick Swayze provides live-action for the scene against an ILM bluescreen.

The first clicker sequence to be shot was the aftermath to Carl’s death near the end of the film. At first unaware that he has been killed by a falling pane of glass, the ghost Carl registers shock as he discovers his lifeless body and then horror as eight dark figures arise from the shadows and carry him off. Van Vliet was on hand for the live-action plate shoot. Then, with a print of the plate for reference, he and Kean began shooting the clicker sequence on a bare black stage. “We would roto out the scene,” explained Van Vliet. “I would do a layout, just as if it were animation, drawing the whole thing out. Then Mike Jittlov would come in, and I would say, ‘I want you to start here and then I want you to move here and you have to make contact on this frame.’ Of course, it was a completely black set and there was nothing on it for him to relate to. In the early stages we tried laying a grid out on the floor; but we found that in doing the actions, Mike never got a chance to look at the floor anyway. So he just got to a point where he memorized all of his moves. On the real difficult ones, someone would call out directions to him: ‘Okay, you’re approaching frame thirty-nine — start lifting your arms.’ When I look back on it now, I think we must have been nuts to try this — but it worked. We would shoot our footage and bipack it with the plates and it was all very exciting.”

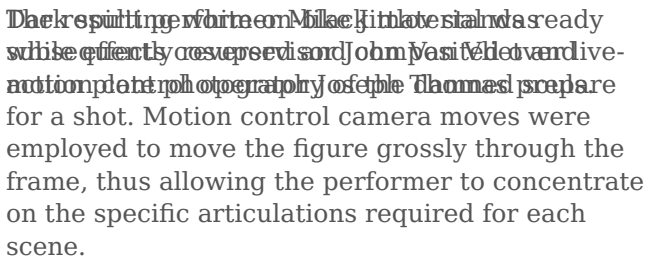
Although there were numerous clickers in the sequence, each was shot individually and Jittlov played them all. It was punishing work — and shortly after completion of the footage needed for Carl's abduction, Jittlov's back gave out from the strain. "We almost killed the poor guy," Kean recalled. "He would be doing things like trying to rise up off the ground in one-frame increments — with eight-second exposures per frame so we could blow the costume around. So we were doing takes that required a half hour or forty-five minutes each. It was like doing t'ai chi for eight hours a day — very difficult. It took a lot of discipline. Mike could not sneeze or have an itch or get thirsty. He was in misery. After Carl's death, he just could not do it anymore. He had given all he could give."

The two principal villains meet violent deaths and are promptly dragged off to the netherworld by dark and shadowy spirits. Footage of the dark spirits was produced at Available Light by animating — in more-or-less stop-motion fashion — a live performer dressed in white against an all-black background.

Upon Jittlov's departure, the Available Light team enlisted a highly skilled mime as a replacement. After two-and-a-half weeks with the mime, however, it became apparent that an ability to control one's body was not enough for this assignment. "As animators," Van Vliet related, "we think in terms of twenty-four frames a second. But the rest of the planet does not divide up moments of life into twenty-four increments per second. So even though someone might be able to do extraordinary mime work, he would not necessarily understand the timing — which was exactly the case. Finally, Bill Arance — one of our grips — pulled me aside, and said: 'Look, it's not working. Give me the suit. I'll do it.' So Bill put on the suit and he was great. He had been watching it all this time and he has an animation background, so he understood what was needed. He wound up doing about ninety percent of Willie's death, and I stepped in a few times when Bill's back went out."

Benefitting from what they had learned in shooting Carl's death, the Available Light team refined their methodology for Willie's demise, using a motion control camera system to simulate

the gross clicker movements. The technique was akin to spaceship photography where models are generally mounted on stationary pylons and made to appear in flight by a combination of camera and dolly moves. “The computer and the track did all the actual moves on the character to make it look like he was walking or running along,” said Van Vliet. “That allowed Bill to concentrate on the action of his feet and hands and their placement in relation to Willie. So we basically put two channels of thought into Bill, letting the computer handle the other two channels on the timing and everything. Also, the concept was that these clickers just come up out of the ground. We had tried having Bill physically crawling up out of a hole, but that did not work. It was too clumsy and it looked exactly like what it was. So instead, we did a motion control tilt for twenty frames so it would look like he was just growing up out of a spot in the ground. It just could not have been done without motion control.” During principal photography, a ‘wild’ cable rig had been used to fly actor Rick Aviles down the street. Later on the effects stage, Van Vliet and Joseph Thomas spent many days plotting the action and programming match-moves on the portable motion control system provided by Chris Nibley. The corresponding motion control pull-away required eighty feet of track.



Dark-suited performer Mike Jittlov stands ready while effects supervisor John Van Vliet and motion control operator Joseph Thomas prepare for a shot. Motion control camera moves were employed to move the figure grossly through the frame, thus allowing the performer to concentrate on the specific articulations required for each scene.

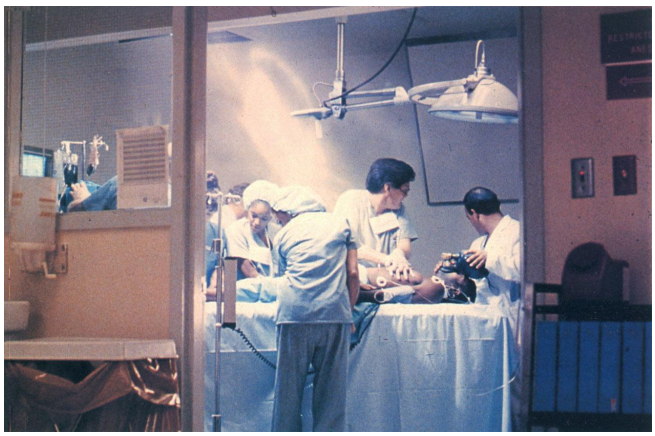
After ten weeks on stage, the grueling stop-motion shoot was completed. Kean and Van Vliet then made negative prints of the white-on-black footage. The resulting black-on-white material was next bipacked — one character at a time — to assemble the six or seven figures needed for each scene. “After each element was bipacked, we would run it on the Moviola to see how it worked with the live-action plate. Because Jerry wanted everything to be very dark, we had to pump up the exposure on all of the backgrounds so we could see what was actually going on — otherwise it would have just been dark mush.”

Extensive rotoscoping by Marsha Carrington and Candy Lewis was next on the agenda. “The ghosts would constantly be moving through each other or through pieces of furniture,” said Kean, “or sometimes we would have to put them behind Carl or Willie in the scene. So there was a lot of roto on this material, and just figuring out the logistics of it took a great deal of time. Someone had to sit down and basically draw maps: ‘Okay, the clicker is coming in here and passing through this object and around that one.’ And when you get seven of these figures all swirling around and you have to figure out who is passing in front of who, it is no easy task. We had to label them all — clicker A, clicker B and so on. January Nordman was in charge of our matte logic and mapping.”

Because the clickers had gone through such a long evolutionary process, Zucker came up with ideas toward the end which necessitated supplemental animation after the fact. “Jerry decided it was important that the creatures actually make contact with the ground,” Van Vliet said, “so we airbrushed in a bunch of little legs or skirts. Jeff Howard animated most of those — going in and figuring out how to articulate all of the legs together with the existing bodies. Beverly Bernacki made a beautiful optical blend with the elements. Also, there were two or three scenes where Jerry wanted the articulation to appear more pronounced. Since it would have been a

tremendous job to go back in and restage and reshoot all of that, we just went in and animated some extra skeletal arms that would come in and smack the guy — or whatever else Jerry wanted. We stuck in extra arms and legs all over the place. We added a lot of shadows, too, and snail-like trails that the clickers leave behind them."

Though Available Light was engaged most heavily in the clicker sequences, they also were responsible for creating the 'good spirits' — the balls of light that come to escort worthy souls to heaven. The good spirits first appear in the dark alleyway shortly after Sam's death. "We had photographs of the alley location," Kean noted, "and we airbrushed on top of them to show our concept of what the lighting should be like. Jerry liked it right away. John was there when the plates were shot in New York to make sure everything went right. Even though the beam of light itself was going to be an animation element, we still needed a certain kind of spill light on the street that was supposedly from the beam. Adam Greenberg did a beautiful job of lighting the shot."



Available Light produced cel animation to depict good spirits shepherding the soul of a deceased accident victim to heaven.

A series of animation elements was generated to create the beam of light and the spirits attending it. “There was an air-brushed beam,” explained Kean, “and then an animated texture — like an inner core — so that it had graduated layers. We shot it as a moire — with four or five pieces of art — so the final effect is actually a bunch of moire effects stacked together. Then we had to matte Sam because most of the time the beam was all the way around behind him. We split the exposures so it was a little spilled over and we diffused him so that it would look like he was in some kind of atmosphere. Then we added dots of light — ‘God’ lights — which were little backlit pinholes shot on the Oxberry. We had only one piece of art and we did a motion control program for each dot so that it could come down its own path. Those shots required fairly long exposures because we were using such a little dot. And because there were so many of them, it took quite a few days to shoot them all.” In addition to providing the beam of light and the spirit shapes, the animators had to alter the live-action plate. “One of the problems was that there were all kinds of other lights on the street. So besides adding our lights that came down from above, we went into the plates and made extensive airbrush mattes articulated to the background. As the God lights appeared, the background lighting shifted to darken or eliminate many of the city lights.”

Dark spirits emerge from the shadows to claim Carl Bruner (Tony Goldwyn) — Sam’s erstwhile friend whose greed triggered a chain of events that ended in murder.

Although as many as eight dark spirits appear in some shots, each was photographed individually. The spirit performer had to divide his action into twenty-four-frame-per-second increments and hold each discrete segment for an eight-second-per-frame exposure. Grip Bill Arance directs a powerful fan at the character. Wind effects were employed to whip the tattered costume about during each single-frame time exposure, thereby imparting an otherworldly look to the figure when projected at normal speed. Extensive rotoscoping was needed to insure appropriate interaction of the spirits with the live-action plate material and with each other.

The good spirits appear again in the hospital where Sam witnesses the death of a patient and his subsequent ascension into heaven. “We went in to shoot the plates,” said Van Vliet, “and we were going to shoot the patient in bed with all the nurses and doctors running around attending to him, then get everyone out of the room and put black velvet behind him for the shot of his spirit sitting up and rising out of his body. So we got ready to shoot and then they brought the actor in — and he was black! No one had thought to tell us. There was momentary panic since we figured a black man was never going to show up against a black background. But Adam

Greenberg just pumped a little more light on him and everything was fine." Another potential problem arose. A pneumatic rig had been built to elevate the actor into a sitting position, but it failed to function properly on the set. "Fortunately, this guy was in such incredibly good shape that he was able to do a very slow sit-up without the machine. Walter Murch later had the idea to run the footage backwards so that it would not look like he was straining. The actor would sit up perfectly smoothly and then lay back down very slowly — and we took the section where he laid down. Then we diffused it and made it very soft, pulling a high-con matte off of him and double-exposing it in."

"There was a very long cross-dissolve to the animation which started at almost the same time as the live-action," Kean elaborated. "It begins as he sits up — all the little God spots come in and land on his chest like they are taking possession of him. Then as he sits up, his image is slowly turning into animation of the character as he levitates up and out. We also changed the lighting on the plate, dissolving down the background, making it darker as the effect came up. It was a long scene and we had to do a lot of little tweaks and changes on it."

Available Light had originally been slated to realize the end sequence of the film in which Sam ascends into heaven. "Initially," said Van Vliet, "the ending was just going to be a relatively quick event with a beam of light coming down. But then it evolved into a long walkway into heaven and eventually ended up becoming a three-minute-long sequence. The plan was still to do it all with animation, but as time ran out and the sequence got longer and longer, we had to tell Jerry that it just was not going to happen with animation and we had better start looking at stage elements. At that point, Richard Edlund came in with the novel idea of using video compositing — which was brilliant. For what they had to do and the time they had to do it in, video was a perfect solution."

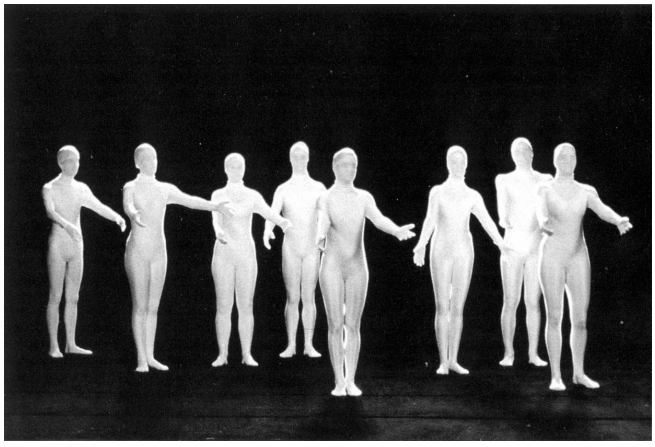
Drawing from frequently documented accounts of near-death experiences, Zucker conceived the end sequence as a brilliant tunnel of light, with many peaceful souls waiting in the distance to accept Sam into their fold. Zucker had described the scene to several sketch artists, but no one had been able to come up with a satisfactory rendering. Finally, Harrison Ellenshaw produced a large oil painting that depicted a brilliant source light radiating outward toward the edges of a Rorschach-esque shape that could suggest either human souls or clouds depending on the viewer's perception. At last the director saw his vision realized. Though Ellenshaw left the production early on to join the Dick Tracy effects team, his conceptual painting remained the definitive reference for actualizing the end sequence.

It was not until Boss Film Corporation entered the picture, however, that a suitable means for translating the painting to film was proposed. "Richard Edlund looked at the picture," said Zucker, "and listened to what I had to say about it — what I liked about it, what was there that I wanted to capture on film. Richard has an aptitude for listening and he was able to pick up on the essence of what I wanted right away. He also has a great artistic eye and could tell me if what I was asking for would not look good or would not work."

Edlund believed that the Ghost end sequence would lend itself perfectly to film elements manipulated and composited on a Harry — a digital editing and effects device. "Because of the look of the sequence as Jerry described it — relatively soft and strange — I began to think in

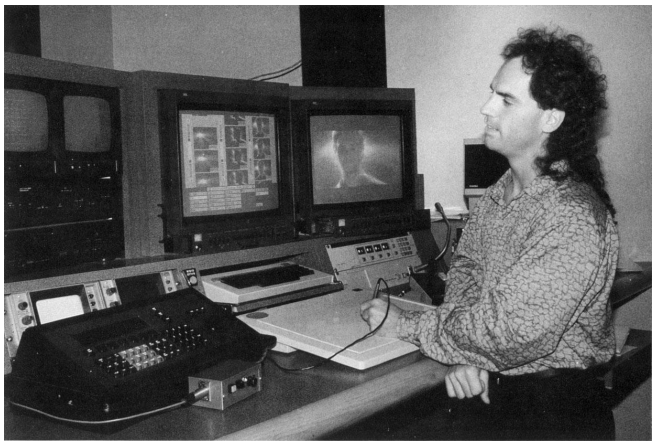
terms of digital image enhancement," Edlund explained. "They wanted to have the sequence in some form for the test screenings, which meant we had a very tight schedule in which to produce these effects. Also, I felt Jerry needed the opportunity to change his mind while we were working. To do that optically would have taken weeks. So I suggested we do the test screening material in video — take film elements, manipulate them on the Harry, then go back to film. That could all be done quickly and I thought we could probably use the same technique for the actual shots in the film. I had had some experience with the Harry because we have been doing a lot of commercial work lately. It is far faster than optical — and even though the quality is not as high, in this case it was just right for the sequence."

Though many were skeptical about the video approach — most especially Walter Murch — Zucker and Paramount commissioned Boss Film to produce a test. Starting only with a work-print bluescreen element of Patrick Swayze turning and walking away, cameraman Garry Waller began shooting additional film elements that would — when manipulated on the video system — create the heavenly background. To ensure the quality of the image, all of the elements were shot on film initially, then transferred to tape for manipulation. "We found that if you start with a film element first," said digital effects supervisor Jim Rygiel, "you get a quality that just cannot be duplicated doing it directly with video. You actually pick up film grain in the transfer process which helps to give it a filmic look. If we had had some film elements and some video elements, they would not have blended because video is basically too clean."



Late during the postproduction phase, Boss Film Corporation was brought in to execute the end sequence in which Sam at last appears to Molly for a final goodbye before ascending into heaven. Among the elements employed in the sequence were eight dancers dressed wholly in white and photographed on a black stage to represent angelic spirits.

Because of the tight schedule for producing the test, Waller culled from existing effects footage as well as shooting new film elements. "Based on some tests we had done on a different heaven approach for the film Date with an Angel, I was commissioned to resurface some interesting results I was getting at that time. These involved rephotographing mylar reflections originally shot by Virgil Mirano. The elements Virgil provided were produced by focusing a beam of light onto crinkled mylar positioned so as to reflect back onto a rear screen that was then photographed. These elements by themselves against a black field were stunning — if the mylar was hit just right it



For maximum flexibility and economy of time, film elements for the sequence were transferred to video, assembled and composited electronically, digitally enhanced and then scanned back onto film. Video compositing was accomplished at The Post Group where Jerry Zucker and effects

supervisor Richard Edlund were able to interface fully and directly with system artist Steve Price.

could create a spectrum of changing colored light — but they lacked scale and depth. It was my idea to use these as base elements. Under the animation camera, we could streak each frame of moving reflection on our pinblock and photograph that streak frame by frame. We could also drag the image up or down anywhere within the frame to create a ceiling or floor. The approach paid off as the changing mylar kicks and reflections produced a soft cloudlike image. We were also able to create a horizon point that helped to add great depth and scale."

Additional heaven elements were produced with Christmas tree tinsel. "Essentially," Waller explained, "I dragged an endoscope through a trough of tinsel. An endoscope is just a probe with a lens at the end of it. The particular one we used was about fourteen inches long with a lens that was three-eighths-of-an-inch in diameter. The whole thing attached right to the camera. We began by laying a pile of tinsel flat down on the animation table and then just guided the lens in a programmed move through it. The lens only moved about three inches per frame through this twenty-four-inch trough of tinsel, but it overlapped a little bit each time to produce kind of a slitscan effect. The idea was to create reflections within the streak. Because of the movement of the table, it would vibrate a little and look like it was shimmering."

The completed film elements — including the bluescreen footage of Patrick Swayze — were then transferred to D-1 videotape — a component format digital tape of much higher quality than broadcast video. Once on D-1 tape, the multiple elements were taken to The Post Group and manipulated on their digital editing and effects system by Harry artist Steve Price. "The Harry is made by Quantel — an English company," noted Price. "The system allows me to do all of the basic editing functions — cuts and dissolves, mattes off of bluescreen — as well as several image processing techniques. In addition to the Harry, I had a Paintbox — which allows frame-by-frame rotoscoping and animation — and an A-64 disk recorder which is another digital compositing device. I used that for my composites, doing an additive mix so that I was basically adding image B on top of image A so that the picture would get brighter or more colorful or whatever we wanted. We also used an ADO, which repositions the various elements, and a DFX, which is similar but has a few extra features. All of this equipment is in one room."

With Zucker in attendance — also Edlund and Rygiel and visual effects editor Howard Stein — Price began by working on the background elements for each shot. "We would bring the background elements in and most of those needed to be altered — made darker or changed color-wise — and that was all done on the Harry. All of the organizational things were done on the Harry — the editing, getting the various elements lined up and cutting them to the right length. The image processing capabilities of the Harry allow me to change the speed of an element, and there are defocusing and texturing capabilities as well. There is also a function called 'average' that basically gives you multiple exposures of every frame. You can enter a variable number — number six, for example — and it will do an average of every frame over six frames. So by the time you get to frame six, it is really a combination of frame six, frame five, frame four, frame three, frame two and frame one, all mixed together. What that does is soften the image and give it a sense of motion. We used that with some of the light beam elements to soften them out a little bit. Some of the tinsel elements looked too frenetic for heaven, but the

average function would make the beams and flickers come and go more slowly. It did not actually change the speed, but it did soften the motion."

The composite heaven background was created on the Harry and the A-64 by taking the mylar and tinsel elements shot by Garry Waller and printing them several times, layering them on top of each other to create a changing cloud formation. "Off of that, I would make an outline of the element. Through that outline I would then print a different element, playing around with the edges. Next I would create the beams of light a frame at a time using a feedback loop. So the light was strictly electronic imagery that would then be double-exposed on top of the background. On top of that — for the center of heaven — we added a whitish glow that gave the interior more brightness. It was just an overall circular haze that was very white in the center and then faded off. Patrick Swayze would be matted on top of that."

Edlund found the video process similar in many ways to film effects work. "To a certain degree, we used film-style techniques — mattes and highlight extraction and generation of contrast. All of those things still work with the video technique. You can double-dupe on video to get highlight extraction, then go back in and animate and do motion control match bits, traveling mattes, roto work — all pretty quickly. There is a lot you can do if you have a video artist who understands how to manipulate the Harry really well. I think we pushed the envelope about as far as we could without getting into traditional video artifacts."

When the finished test was presented to Zucker and Paramount executives a mere one week after it had been initiated, all were ecstatic about the results. "It was really a finished shot," noted Edlund. "It looked good enough to cut into the movie, even though it was all done from workprint elements and in record time. The test was an interesting challenge for us because we were basically going through the exercise of doing the whole sequence —just with scaled-down, hastily done backgrounds. But it was really valuable, because during that run-through we developed a visual language and came to understand the sequence and what Jerry wanted. So the test was incredibly useful. We were actually able to save money when we did the sequence for real because we knew where we were going with it."

Having been given an enthusiastic go-ahead from Paramount, Boss and The Post Group repeated the test process for real. Waller shot new, refined film elements based on what had been learned in the test. Among them were the balls of light — representing the good spirits — that appear within the beam of light that comes down from the ceiling of the loft. "The balls of light were basically lens flares," said Waller. "We used a pin-light source and went right into the lens. We shot them on the stage so we could get some movement out of them and created a scintillating effect by adjusting the exposure electronically with the camera controller. Essentially, we were matching the balls of light done earlier by John and Kathy at Available Light."

As the brilliant light falls on Sam, he is revealed in a ghostly form to Molly. Zucker and Rubin had justified the sudden appearance — at least in their own minds — early in their collaboration. "Bruce and I decided that Molly can see Sam at this point in the film because she has opened her mind to it all," said Zucker. "She could not see him before because she had closed her mind to the possibility of Sam's spiritual existence; but when she sees the penny

slide up the door, her mind is opened to the point that she later is able to visualize him. Dramatically, it was important that Sam and Molly have one last chance to say goodbye and to say ‘I love you.’ We felt that was justification enough. You can’t approach this movie with the logic you would take into a murder mystery — you have to flow with it. If at that point in the movie anyone is worried about the logic of it, forget it — it hasn’t worked for them.”

Sam’s form — as he is revealed to Molly — is surrounded by a brilliant halo of light. The halo effect was generated by manipulating the tinsel elements on the Harry. “The matte of Patrick Swayze had been done when the bluescreen image was transferred to tape,” stated Price, “so it was a video element not an optical element. He was matted on top of the scene, but he did not have a glow around him yet. I took his matte and created an outline matte off of that. Basically it was a thin white line on black that had the outline of his matte. Using that as a matte, I put one of the tinsel elements inside of it, ending up with a thin outline of tinsel on black. Then — with the A-64 and DFX — I did something that, in film terms, is like a slitscan. I created streaks coming towards the camera that were very soft and moving — and those were double-exposed on top of him after he had been matted onto the background.”

Unseen and unheard by her since his demise, Sam appears before Molly in ghostly form as heaven opens up to accept his spirit. Background imagery for the ensuing sequence would include crinkled mylar reflections directed onto a rear process screen as well as tinsel reflections captured with an endoscope and streaked photographically. All were modified and layered together during the video compositing session.

The lovers share one last kiss before Sam turns and walks away into the white light of heaven. The side-angle kiss had been photographed with Patrick Swayze against black rather than bluescreen — which proved to be problematic. “We had to generate an animated density matte for him,” explained Edlund, “which ultimately was semi-dropped because Jerry decided he wanted to have transparency in that one shot. It had been shot against black in the first place because at that point Jerry was not exactly sure what he wanted. He thought there would just be a superimposed ‘something.’ They had Patrick kiss a card; so part of his mouth burned away, which made it difficult to get the positioning just right. We had to do a traveling matte on him. It was difficult. I knew that shot was going to be our toughest one because we had to fix something that had been photographed with another idea in mind. But it came out fine.”

For the heavenly vista as Sam turns and departs, Zucker wanted to suggest the brilliant light and inviting spirits reported in many near-death experiences. Again, electronic means were used to assemble the photographed film elements, including the eight dancers which were replicated and repositioned to create scores of beckoning spirits.

After the kiss, heaven appears to open up, flooding the room with light and revealing spirits in the distance waiting for Sam to join them. Edlund brought in eight dancers to act as the spirits and Zucker himself choreographed their movements. “The dancers were in white bodysuits with white bathing caps and white makeup,” Edlund remarked. “We shot them against black at different levels and positions.” Garry Waller photographed the dancers full-frame so that the spirit imagery could be multiplied and moved around later during the digital phase. “They were choreographed so that if we flipped them from screen right to screen left we could build dozens of them.”

The film footage of the dancers was assembled in frame during the digital process. “The dancers were all repositioned on the ADO so that what was initially just a few people ended up being a whole troupe,” Price commented. “I think we had about fifty or so in the last shot. All of them were positioned so that as Patrick Swayze turned around and walked toward them, they would cover him over partially. We timed the transition on him between being sort of ‘normal’ Sam in blue jeans and dark shirt to Sam turning into a white spirit and just blending in with the others in the background.”

In addition to the end sequence, Boss was asked to provide point-of-view material for two pass-through scenes — the first when Sam passes through an orderly in the hospital where his lifeless body has been taken and the second when he first passes through a solid door. “Some computer animation had already been done for the effect,” said Edlund, “but Jerry felt that the imagery just was not dense enough. The orderly looked like kind of an airhead. I suggested we use some photographs from a book I had that showed human tissue and organs photographed with an electron microscope — and then do a series of push-ins on these photographs. We found the author of the book, got the original photos and reshot them.” Garry Waller began by

photographing the black-and-white still images on motion picture film as individual elements. These were then taken to The Post Group where they were colorized in reddish-brown sepia tones on the Harry. Other high-magnification photos of the human body were similarly used for Sam's point-of-view inside the door. "We just picked ones that looked more grainy and triangular — images that would suggest wood."

When all of the video effects had been completed on the Harry, the information stored on the D-1 tape was then transferred onto computer tape at Pacific Data Images. "The Harry brings the images in off of D-1 tape," explained Jim Rygiel, "and the final output is also on D-1. So we were given D-1 tape that now had all of the finished scenes on it after they came out of the Harry. What we had to do was read the frames off one at a time and convert them into computer digital images. It was at this step that we were able to add some image enhancement. To compensate for the inherent softness of the digital video image, we went in and overemphasized the crispness in some areas. For instance, we would sharpen Patrick Swayze's face wherever it needed it. The enhancement function could take that area and make it crisper. Of course, we wanted the background to be soft anyway, so we left that as is. We used a Personal Iris computer — a relatively inexpensive, but powerful machine. It is a step above personal computers and a step below mainframes, and it is great for processing frames and filming. We read the frames in and then send them out to our film recorder. The process takes about a minute per frame."

Zucker was more than pleased with the results of the digital video work. "It allowed us to do much more than we ever could have done with traditional film effects," Zucker asserted. "And it was instant. In the Harry sessions, Steve Price would sit there with his little light pen on the computer and say, 'How does that look?' And I could say, 'Well, I imagined it being a little flatter and coming from over here' — and he would just do it! A few minutes later it would be right there for us to see. We would assemble a whole ten-second shot and I could look at it and we could play with it right on the spot. It was an ideal approach for this particular scene because we had had a hard time translating the concepts into pictures. With the Harry, we were able to look at a variety of things, discard what did not work, and keep what did without wasting a lot of time and money."

The successful application of video techniques for feature film effects work was rewarding not only for the director, but also for the effects artists at Boss Film. "We have all been learning these new techniques," said Howard Stein, "and Ghost gave us the opportunity to use them. I think more directors are going to start seeing the value of video compositing — particularly as the ability to output the digital material back to film comes more to the forefront. Of course, there are pluses and minuses to the video approach. One of the minuses is that it costs about a thousand dollars an hour in the video bay. So it is not economical to do your research and development at that stage. Plus video compositing is not appropriate for every kind of shot. Ghost required a unique, specialized look which allowed us a lot of freedom to use this technique. When the material got back to film it did not have to look one hundred percent normal — it was supposed to be a little weird. But even though the shots look different, they do not look like video."

Though he steadfastly maintained that Ghost was not an effects picture, director Jerry Zucker was nonetheless enthusiastic about the effects work on his film. “I had a great time with the effects in this movie and I would do another effects film in a second. On the whole, I would rather work with special effects people than actors. The effects people were very good to me in terms of understanding that I knew nothing about special effects and explaining things very clearly. Sometimes I wanted things that were not really possible — mainly because of money — and they would say, ‘Yes, we could do that, but it would take a crew of one hundred extra people working on overtime.’ So I would know to find something else. They all just love their work and are so enthusiastic and they really believed in the picture. I had all of them see early cuts of the film because I wanted them to know what they were a part of. So many times, effects people work in a disjointed manner — only getting a few feet of film — and are expected to understand the tone of the movie from that. I wanted them to understand how romantic this film was and how the effects fit into that. My fear going into this project was that each effects shot had the potential of taking people out of the movie and reminding them that it was just trickery. But the effects people did such a good job that the audience does not question the concept — they just go with it. In fact, one of the greatest compliments we got was from a guy who said that he so believed Sam as a ghost passing through things that in the scene where Sam learns to move things and he kicks the can, the guy sat there for a minute and thought: ‘How did they do that? How did they rig it so that he could kick a can?’ And I thought that was great — it was exactly what I wanted.”

Ghost photographs copyright © 1990 by Paramount Pictures Corporation. All rights reserved. Production unit still photography by Peter Sorel. Industrial Light and Magic photography by Kerry Nordquist, Sean Casey and David Owen. Available Light photography by John Van Vliet. Boss Film Corporation photography by Virgil Mirano. The Post Group photography by Ron Eisenberg. Special thanks to Lisa Van Cleef, Claire Wilson, Michael Kochman and Janette Boatwright.

CRIMESTOPPERS TEXTBOOK

article by
Glenn Campbell

image

In 1931, comic strips were known as ‘funnies’ — and with good reason. The only ones around then were the illustrated equivalents of today’s television sitcoms. It was, after all, the Depression, and America desperately needed the distraction provided by a good bit of humor. A guaranteed daily dose was always enclosed in the morning paper, eagerly awaited and, more often than not, read first by parents before their kids got the chance. Some strips were clever and witty while others indulged in sheer slapstick. Regardless of their level of sophistication, all comic strips shared a common trait — they were comedies.

When Dick Tracy appeared in the October run of the Detroit Mirror it signaled the beginning of a new art form — the illustrated mystery serial. Stylized and gleefully violent, the strip was unlike anything that had been seen before. It portrayed a razor-sharp world of right and wrong, a world populated by breathless gun molls and villains beyond redemption, most of whom suffered awful fates in the mechanisms of backfired booby traps or at the hands of plainclothes Tracy who never hesitated to plug a wrongdoer.

Chester Gould — the creator of Dick Tracy — quickly established a new tone for comics, one of respect for both his character and his reading audience. Tracy was smart, resourceful and tough as nails. Gould’s readers enjoyed following the soap opera mysteries and found it easy to root for their hero, who embodied all the best traits of manly virtue. Gould enthralled his audience with depictions of accurate police procedures featuring the cutting edge of law enforcement technology.

With a classic comic strip as his bible and the full resources of the Disney organization at his call,

He even introduced some of his own — most notably Tracy's signature two-way wrist radio. Yet, all of these achievements were eclipsed by the one element for which Dick Tracy is still famous six decades after the strip's introduction — its villains. Chester Gould's collection of bizarre gangsters is perhaps the most fondly recalled element of his work. Criminals like Flattop, Pruneface and B-B Eyes were almost as popular as Tracy himself. Most of them were killed off in ingenious ways and all served to prove Gould's main point — crime did not pay.

producer-director Warren Beatty launched into a $30 million adaptation of Dick Tracy, with himself in the heroic title role. Tracy responds to a call on his two-way wrist radio.

Dick Tracy met with overwhelming success. Although the tales were always intended to be entertaining, the overriding theme of Good versus Evil struck a deep chord in the heart of the American public. Twenty-five years later, actor-producer-director Warren Beatty resonated to that same chord and began to marshal the talent and resources necessary to bring one of his childhood heroes to the screen. Beatty was not the first to do so, of course. Previous incarnations of the stalwart detective had included four movie serials, four motion pictures, a little-remembered television show and an animated series as well. Most of these films featured only token attempts to portray Gould's gallery of misshapen mobsters, a decision heavily weighted by the cost and limitations of cinema makeup in the Thirties and Forties. The Warren Beatty version — produced by the Walt Disney organization and released under the Touchstone banner — would feature more than a dozen Gould villains as it unveiled the story of Tracy's battle against gangster Big Boy Caprice. As Caprice murders his way into control of the mob and control of the city, Dick Tracy finds himself drawn into a battle for both his life and his heart, encountering unexpected enemies and allies on both sides of the battle lines.

Fortunately for Warren Beatty, the art and science of prosthetic makeup had blossomed into a major new division of the motion picture industry by the time he was finally ready to undertake his massive version of Dick Tracy. More than enough talent and ability was available — well seasoned during the five years that Beatty had struggled to develop and prepare his film. Word of the project had filtered throughout the makeup community and it was regarded as a major prize. The only question was who would win it.

It was Beatty's intention to feature the best of Chester Gould's original cadre of villains, and what concerned him most was the acceptable integration of such outlandish faces in a non-camp rendition of the strip's straight-laced hero. How well those mugs would transfer from the page to the screen became the responsibility of two New York makeup artists — John Caglione, Jr. and Doug Drexler — who emerged from relative obscurity to helm the biggest makeup assignment of the year. "Everyone was saying, 'Who are these guys?'" recalled Caglione. "We were rookies of the year." We had been around for fifteen years, done live television and feature films. But we were from New York, which was as good as being on the moon." The two artists had met through a mutual friend — makeup master Dick Smith — who had individually encouraged them as separately budding artists, years apart. "I wrote a letter to Dick when I was fourteen years old. He called me and invited me over for a visit. I had just seen The Exorcist and was raving about Linda Blair's makeup when he asked my opinion about Max Von Sydow as Father Merrin. I said, 'He's a nice old guy, I guess.' And then Dick pulled out a lifecast

of Von Sydow and started putting rubber pieces on it. That was it. I was hooked." Drexler was similarly stricken by the same characterization. "For me, it was ten years after the movie when I saw Von Sydow in something else and thought, 'How can he be young now?' I had seen The Exorcist and never realized that he was rubber from the neck up."

Entranced by the possibilities of prosthetic makeup, Caglione studied available makeup texts and experimented on his own while maintaining a correspondence with Smith. At age eighteen, he found himself recommended by Smith for a position at NBC, where he spent the next few years with the cast of Saturday Night Live executing such memorable characters as the Coneheads. Drexler was twenty-seven when he sculpted his first appliance — a Planet of the Apes mask for his wife — and he was equally hooked. He too contacted Dick Smith, sending him letters and photographs of his work. "Less than three months later, Dick called and asked me if I could work with him on The Hunger for two weeks. My boss would not let me take the time off, so I quit. I wound up working on the film for six months. It was my first movie job and it had everything — three stages of old age makeup, puppets and mummy suits. It was like going to prosthetics college."

Two frames from the opening shot of the film — an effects tour de force that begins on a live-action element of Dick Tracy at his doorstep and then climbs upward toward the rooftops, panning fluidly past miniature foreground structures and a vast painted cityscape before descending to street level again on the other side of town. It was the intent of the director and his creative team to present on film a true evocation of the Chester Gould comic strip that inspired the production — fanciful and stylized as though the story were in fact taking place in a comic strip world. The grand opening shot was conceived as a means of setting the tone and establishing that off-kilter world for the viewing audience.

With Dick Smith as a mutual friend it was inevitable that the two budding makeup artists would meet. “I called Dick to get help in locating someone to split the workload on Amityville III,” Caglione explained, “and he recommended Doug. We hit it off and have worked together for nine years.” The two men share a boisterous sense of humor and an abiding love of their chosen profession. Unfortunately, their skill and dedication was not enough to offset the onus of their New York location. “All the really hot jobs originated on the West Coast,” stated Drexler. “Everything we worked on had a number after it — Poltergeist III, Amityville II and III, shows like that.” The pair also acquired a few respectable credits on films such as Quest for Fire, Zelig, Fatal Attraction and The Cotton Club. It was the latter which would prove fortuitous for them.

Two frames from the opening shot of the film — an effects tour de force that begins on a live-action element of Dick Tracy at his doorstep and then climbs upward toward the rooftops, panning fluidly past miniature foreground structures and a vast painted cityscape before descending to street level again on the other side of town. It was the intent of the director and his creative team to present on film a true evocation of the Chester Gould comic strip that inspired the production — fanciful and stylized as though the story were in fact taking place in a comic strip world. The grand opening shot was conceived as a means of setting the tone and establishing that off-kilter world for the viewing audience.

“We heard about Dick Tracy about four years before it began production,” Caglione recounted. “We worked on Cotton Club with costume designer Milena Canonero who knew that Tracy was coming up soon, and she kept in touch with us. We happened to be in L.A. on a TV movie and called Milena to have lunch, and it turned out she was just setting up a meeting with Warren Beatty regarding Tracy. So, just like that, we went up to Warren’s house.” Present at the meeting were executive producer Barrie M. Osborne, coproducer Jon Landau and production designer Richard Sylbert, all of whom had encountered the prosthetic men during various productions. “Warren was the only stranger in the room, so we had a lot of great allies at the meeting and that’s what got it started.”

Once the assignment was secured, the first order of business was determining the viability of the world renowned Dick Tracy profile. The knife-sharp nose and jutting chin could easily have become a source of derision and distraction among moviegoers. Though there were many who voiced that conviction, Warren Beatty was not one of them. “Warren really wanted to do the makeup,” said Drexler. “He fought for it. We said that to be perfectly honest we thought it was crazy. And then we got twenty-five ‘Whys?’ He said: ‘Fight me. Convince me that I shouldn’t wear it.’ So we did. But he did try wearing one, just to see. We shot a video test and it was awful. You can’t put a hawk nose on just anybody. It didn’t work and we thought it was a bad idea anyway. For one thing, he was the director, producer and star of the film. To have him in the makeup chair every day for two-and-a-half hours would have been crazy. But the other thing was that he is Warren Beatty. His face is really his fortune. To change that face is — as John put it — like changing the Coca-Cola sign. Besides that, everything in Dick Tracy is so symbolic, and Warren already fulfilled what Dick Tracy needed to be — good looking, dashing and heroic.”

“Warren made a good contrast with the villains also,” Caglione said. “We saw him as the anchor to reality. He’s the normal element in there. If you make him weird, then you lose that contrast. The thing with the comic strip Dick Tracy is that he’s got a face like a steam shovel. You would have to obliterate somebody to replicate that. You would need to do an entire rubber head. It was hardly practical to cast Warren Beatty and then hide him under a mask.”

Thus, no makeup for Beatty. Chester Gould’s surrealistically drawn villains were another matter entirely. “The comic strip was our bible,” Drexler noted. “The decision we had to make early on was how far to go. In the beginning, Warren was undecided as to whether they should be real far out like ‘toons’ or what. We always fought for the idea that they should be a half a turn of the screw into fantasy. That was our motto on this picture. We wanted them to be able to go out onto the street and maybe get a few looks, yet not be so far out that people would laugh or scream at them. Flattop had to stand next to Warren and Madonna, so he could not be too ‘out there.’”

Actor William Forsythe was the man both fortunate and unlucky enough to have been cast as Dick Tracy’s most popular villain. Flattop appears throughout the film, aiding and abetting the chief mobster, Big Boy Caprice. A lot of screen time meant special attention in the makeup chair, which Forsythe did not suffer gladly. Required to create the Flattop character were fourteen overlapping prosthetic pieces — some less than an eighth-of-an-inch in thickness. The initial application time was four hours, eventually reduced to one-and-a-half hours by the end of the production. The foam appliances included a triangular skullcap, ears, upper and lower lips, separate cheeks that also formed the foundation of the nose, additional nose pieces, wrinkled forehead and neck piece. “Bill was completely encased,” explained Caglione. “The only thing you see of him are his eyes. He was first in the makeup chair every morning and the last one out the door every night. Nobody ever saw what he really looked like. Bill’s a tough guy and he felt a little picked on because he had more rubber on than anybody else in the whole show and he wore it more than anyone. Sometimes there would be dents in the Winnebago wall — he used to beat his head against it out of frustration. It was tough having all this stuff glued on for seventeen hours a day. You start to feel a little claustrophobic.”

Forsythe was not the only actor to find the experience unnerving. “All the actors hit a wall,” recalled Drexler, “just like a marathon runner. At about fifteen to twenty applications — wham! It was like the guy in the submarine who suddenly runs up the ladder screaming ‘I gotta get outta here’ and takes everybody else with him. As a makeup artist, you have to work with your actors and help them through the process. You have to be a pretty fair psychiatrist in a way, to talk to them, keep them calm, find out what kind of music they want to hear, that sort of thing. One of our makeup crew, Jill Rockow, was just terrific at maintaining an actor’s calm during a makeup session.”

In addition to their psychiatric duties, Caglione and Drexler found time to rethink their original approach to constructing Flattop. “Actually,” admitted Caglione, “his whole makeup was redesigned while we were shooting the picture. There were totally different appliances eventually, because we found little bugs and glitches in the first set that we designed. Little things like the way that they laid on his face. Originally Flattop had sides-of-the-face pieces and

a separate neck. That meant we had to deal with an edge that ran all the way across, side to side. It also added another fifteen minutes of application to glue on a separate neck and blend it into the sides-of-the-face pieces. So we remade it as all one wrap and it went on in one shot. We made new lips and a chin for him — and a new forehead. His ears were also redesigned on the job. We did not change the actual sculpture — just the technical part of it where the appliances ended and where they overlapped. We were nipping and tucking all through the shoot."

Helping them nip and tuck was a small but dedicated crew of artists and technicians — most notably Ve Neill of the Oscar winning Beetlejuice team. Makeup specialists Kevin Haney and Craig Reardon supplied solid support during the production, along with lab crew members Gregory Smith, Bruce Fuller and Gil Mosko. Keeping an overall eye on the effort were lab coordinator Dawn Severida and lab manager Anthony Fredrickson. The crucial foam latex elements were supplied by Drexler's wife, Donna — known to one and all as the 'Foam Fatale.' "Donna runs superior foam," stated Drexler. "You could give the same components to somebody else and they would not get as good a result. Foam rubber is affected by humidity, barometric pressure, every little thing. Depending on the conditions, it can shrink or become stiff. Donna has a talent for foam work, which is great because it's one of the keys to our business."

Flattop was only the first in a long line of latex lawbreakers who marched out of the makeup shop. The assignment of creating a dozen Gould villains resulted in an unexpected bonus job for Caglione and Drexler — aiding in the selection of actors to play the parts. Although certain name actors had already been cast in key roles, Warren Beatty allowed the makeup duo considerable say in the casting call process that would supply the remaining mobsters. "Warren never did a casting without going through us," related Drexler. "We looked at everybody with him, and he trusted our judgment. Kurtwood Smith — who played the villain in RoboCop — came up for consideration and John and I were thrilled. We were telling him how great an actor we thought he was and how much we would like to work with him. And then Warren asked what we thought of him as Pruneface. Long pause. No way. We all knew we had to pick the right face for the role — we had to start off with the right underlying structure — and it just would not have worked." Eventually veteran character actor R.G. Armstrong was selected for the role. He was not the makeup duo's first choice, however. "We suggested Ronald Reagan for Pruneface," laughed Caglione. "It would have been perfect timing because he had just left office and was out of a job. R.G. Armstrong made a wonderful Pruneface; but if you look at his makeup, you'll see some of Ronald Reagan in there. Pruneface has Reagan's liver spots and ruddy cheeks."

Pruneface was another encasement situation. Only Armstrong's eyes remained intact and he never quite mastered the art of bringing the makeup to life. "He wore a lot of rubber and never really played with it," Caglione commented. "Under prosthetics, some actors perform stiffly as though they feel they're going to break the makeup. They don't realize how much you have to exaggerate. We had the same situation with Tony Epper, who played Steve the Tramp. His makeup was very thick. The chin was three inches off his own chin, for example. In the scene where he is eating chicken in the shack, we went in to give him some extra direction. He needed to know that you have to exaggerate one hundred twenty percent underneath to get maybe fifty percent on the outside." Not every villain required extensive prosthetics. Actor Ed O'Ross escaped the marathon makeups by looking like Itchy from the start. "There was

something about him that made us see Itchy. Ed only wore an upper and lower lip, a ski slope nose and a full paint job.”

Matte shots were produced by the Buena Vista Visual Effects Group under veteran supervisors Michael Lloyd and Harrison Ellenshaw. Matte artists Michele Moen, David Mattingly and Peter Ellenshaw labor side by side on the opening painting — the largest in the film at twenty-four feet in length.

Artist Paul Lasaine at work on a billboard incorporated into the city scape. Frequent changes of mind on the part of the director as to what types of signs were appropriate resulted in most of them having to be painted over and over again.

James Caan as Spaldoni — appearing in a cameo at Beatty's behest — found himself enjoying a trip down memory lane under the hands of the makeup crew. "We were not really sure what he was going to be," revealed Drexler. "When we got his lifecast back to the lab we found that if we just did a nose on him, he looked a lot like Marlon Brando as the Godfather. Even Spaldoni in the comic strip had a Brandoish look to him. So we figured we would not tell Caan what we were up to. If he caught it, fine. The minute he got the makeup on, he ran with it, breaking into a terrific Godfather impression. So Spaldoni became our tip of the hat to Dick Smith. We gave Caan the nose, freckles and liver spots — making him a sort of spoof Brando."

Miniatures incorporated into the shot were built by Stetson Visual Services and photographed at The Chandler Group with motion control camera moves. Michael Lloyd surveys the setup.

The next cameo proved to be more of a challenge. Beatty buddy Dustin Hoffman agreed to appear in the film as the imcomprehensible Mumbles. "We had five days to get him together," lamented Drexler. "Five days to do a major character. There was no testing, no time. To capture Mumbles, you have to have the droopy eyes and the confused lips. Ultimately, the makeup included rubber eyelids, the wayward lips, a latex chin, plus a bald cap and wig. No one saw it until the day of shooting." Six hours after winning the Oscar for Rain Man, Hoffman was in the makeup chair. No one — Beatty included — saw the final result until the actor walked out onto the set. Almost everyone was impressed. "Hoffman's wife saw the makeup and said, 'I guess they couldn't do anything with your nose, huh?' The great thing about a lot of the makeups in Dick Tracy is that they look like nightmare versions of the underlying actors. Instead of covering them over, we always tried to split the difference between the spirit of Chester Gould's character and the spirit of the actor, never losing sight of one or the other. Henry Silva played Influence — a cadaverous menacing thug — and Henry would look in the mirror and lament that no one was going to know it was him. Then he would leave the trailer and two seconds later someone would say, 'Isn't that Henry Silva?'"

The makeup crew's largest creation was glimpsed only briefly on film, snuffed out in a brutal machine-gun assault on some poker playing hoodlums. Lost in the carnage was the Humpty Dumpty-like Little Face portrayed by Lawrence Steven Meyers. "Little Face was more like an effect than straight prosthetics," noted Drexler. "We knew that we needed to put someone in an oversize head and body, and so the plan was to use a little person who would have a small head to begin with. Oddly enough, Warren and Jon Landau literally ran into Larry Meyers on the street and said, 'That's him!' Larry had done some acting, but was now a vice president at Lorimar. Nonetheless, he agreed to do the part. We built a substructure that fit firmly over his head and then blended his face into a giant polyfoam headpiece. It was quite a job because it needed a huge wig and a giant hat the size of a coffee table — so the wardrobe department had overlap with us as well."

“We had a fan inside the head to keep him cool,” added Caglione. “We also built in a headset telephone so the guy could stay in touch with his studio. The entire head only weighed about fifteen pounds. We made it as lightweight as we could. We even built a wheelchair with fiberglass shoulders on it so that we could put him in the chair, crank up the seat to fit him into the shoulders, put the chest ‘door’ on him and then roll him right onto the set, camera ready. We were kind of disappointed with the sequence as it turned out, because you do not really see the character’s hat and shoulders. You needed to see more of him for reference to realize that it’s a little face in a big head.”

If Little Face received scant screen time, quite the reverse was true of Al Pacino as the principal villain, Big Boy Caprice. Always the dedicated actor, Pacino enthusiastically sought to find the best method that would allow him to release his energy into the character. He found the outlet through the makeup, becoming the only actor in the film to help design his own appearance. “Some of the extras in the crowd scenes wore prosthetics to help tie in the makeup to the real world,” stated Drexler. “So Warren ordered up what he called his ‘bag of tricks’ — a collection of generic Chester Gould noses, chins, ears and cheeks. It was like a shoe store for faces, and at one point it looked as though everybody was going to get them. Eventually, only a few people wore them early on in the show. Although we did not use the face piece collection as extensively as we thought we would, it came into play and really paid off with Al Pacino. He was trying to find Big Boy, and the bag of tricks gave him the tools. Basically he played Mr. Potato Head, trying on different combinations of facial pieces until he found the right ones to fit his character. Pacino was cast quite late in the production and for a long time we did not know who Big Boy was going to be. Design time was running out so we were kind of hoping Pacino would not like prosthetics at all. But when we tried the bag of tricks on him, he loved it. He said the makeup let him be crazy. If it had been just plain Al Pacino running around with his own face, he never could have pulled off Big Boy.”

Caglione sculpted the final design for Big Boy based upon all of the pieces selected by Pacino. Though the actor’s version of the character bore no resemblance to Gould’s comic strip creation, no one seemed to mind. Pacino’s makeover required a prosthetic chin, nose, upper lip and a mole on his left cheek. Plugs were inserted behind his ears to make them stick out; and unlike most of the other villains, his hair was his own. “Big Boy’s looks changed a tiny bit during the show,” commented Drexler. “As a matter of fact, for the first couple of days, he had a lower lip. We got rid of it because he really did not need it and it made him even funnier not to have it.”

In keeping with the comic strip motif, only six bold colors were employed through out on everything from sets to costumes to props. Most wide shots in the film required extensive matte work. A street scene rendered by Paul Lasaine involved not only a straightforward painting, but also tracer light animation on the theater marquee.

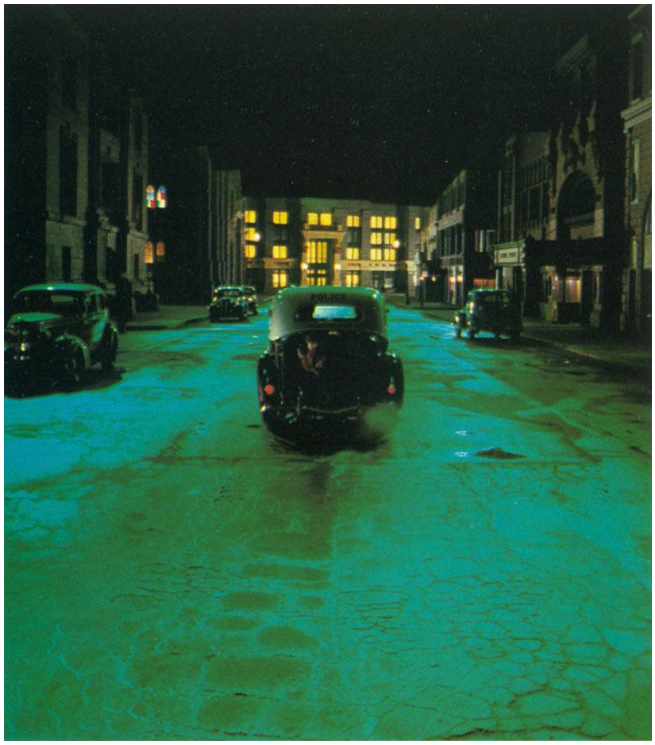


Plate photography was recorded on the Universal backlot.

Midway through another expansive matte shot — by David Mattingly and Michele Moen — that begins on a down-angle of Dick Tracy and Tess Trueheart walking along a street. As the shot progresses, the camera pulls back from the rear-projected live-action and trucks across the fifteen-foot painting surrounding it before pushing in on a second rear-projected image — the Club Ritz exterior. Twinkling stars and city lights enliven the proceedings.

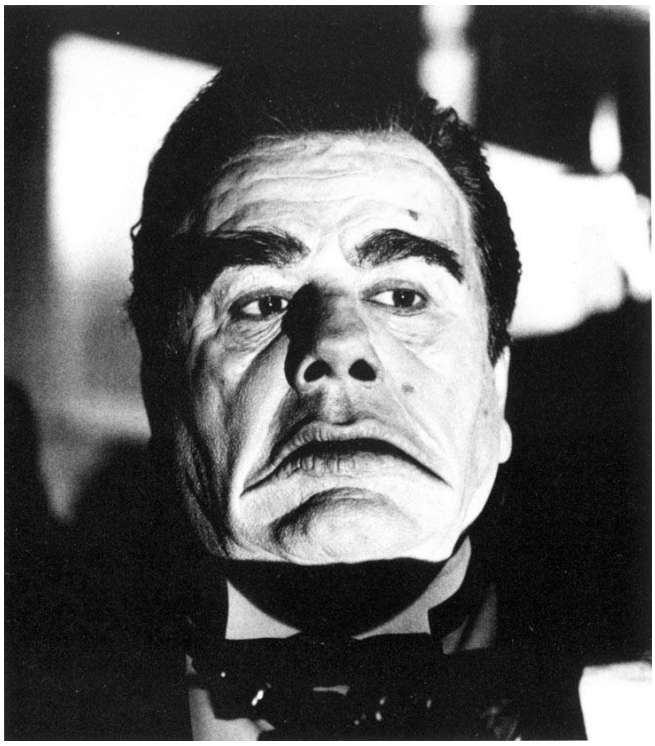
Tracy lectures The Kid on a street corner.

Overall, Caglione and Drexler found Dick Tracy to be an exhilarating experience with few problems encountered during the production. “Most of the problems were not with technique or technology,” Drexler stated, “because prosthetic makeup has not changed all that much in recent years — it’s all just sculpture and painting.” What problems the pair did encounter were not in the makeup trailer but on the set. The director of photography — Oscar winner Vittorio Storaro — had selected a non-naturalistic lighting style for Dick Tracy, one that made sets and actors come to life and coincidentally deadened the prosthetics. “Vittorio had been planning how he was going to light Dick Tracy for years,” said Caglione, “and then we came along and threw a big monkey wrench into it because these characters are not human beings. The job of the makeup artist is to trick the audience into believing that what they are seeing is skin, even though we all know it is foam rubber and paint. Rubber obliterates any inner warmth. Real skin is translucent and you can see veins through the surface. We simulate that by painting veins and red dots on an appliance. But if you put blue light on it, all the things you have done to convey that it is skin are eliminated. The red dots turn magenta, veins disappear and the makeup becomes a piece of rubber again.” Consequently, Caglione and Drexler found themselves occasionally at odds with Storaro, who was torn between the artistic creation of Dick Tracy’s exterior world and the successful integration of some of its major characters. Eventually the disagreement was settled in amicable fashion. “I think the light went on for him when we said: ‘It’s a camera trick. We’re tricking the camera into thinking that it is skin.’ In that moment, he understood.”

Existing buildings were modified and heightened in the Paul Lasaine painting, and the backlot plate was further enhanced with an elevated train track and ground shadows.

Storaro promptly had a makeup mirror rigged that was capable of emitting various colored lighting. This enabled the makeup artists to preview some of the more drastic light situations and adjust accordingly. With harmony restored, Caglione and Drexler could once again concentrate on the prosthetics. “Appliance jobs are our forte,” said Caglione. “That’s what we like to do. There are a lot of talented geniuses doing mechanical creatures and high technology makeup, and that stuff is incredible. But I can’t see myself operating a radio control box.” The two partners are in full accord. “I have to have a makeup kit in my hand and an actor in a chair,” Drexler concluded. “There is a whole science involved in putting edges in places that are not obvious. You have to understand the lines of force in an actor’s face, because if you disregard those things when you’re sculpting the appliance, you’ll have a piece that wrinkles the wrong way when he smiles — and that means you’ve failed.”

Pleased that his villains matched Chester Gould’s designs to well within tolerances, Warren Beatty turned his attention toward creating a suitable environment for his characters. The subject of matte paintings was raised early during preproduction meetings by production designer Richard Sylbert, who advised Beatty from the start that the generic comic strip city they envisioned could be done in no other way. Taking his cue from Gould’s stylized, deco-like comic strip, Sylbert designed a milieu where only six colors would define the visual range of Tracy’s world — red, blue, yellow, green, orange and purple. These prime colors, in addition to black and white, would pervade every object seen on screen. Dick Tracy’s yellow coat would be the same yellow as that of a passing yellow cab. His red tie would match exactly the red on a can of chili. Everything would be rendered in the same limited palette of colors. This philosophy was ultimately carried to its logical extreme and applied even to the exterior of the Universal backlot sets where much of Dick Tracy was shot. Three city blocks of the studio’s venerable ‘New York Street’ were dressed in Tracy colors. Since the buildings were only three stories tall, it was a given that matte paintings would be required to expand the scope of the city.



Engaged to create the misshapen mobsters of the source comic strips were makeup artists John Caglione, Jr. and Doug Drexler. Working with prosthetic appliances and straightforward techniques, the duo strove to engender the familiar Chester Gould villains without obliterating totally the performers’ features beneath. Among the actors transformed was Paul Sorvino as the ill-fated Lips Manlis.

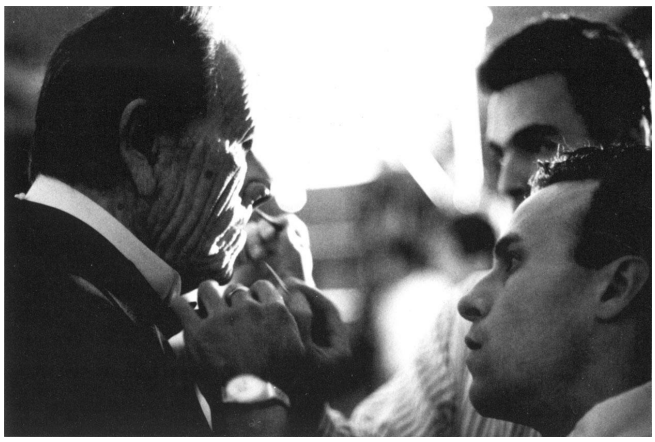
Henry Silva as the cadaverous Influence.

Five secondary characters were developed for a poker game that ends abruptly in a blaze of machine-gun fire.

Selected to supply these paintings and all other associated effects was Disney's resident Buena Vista Visual Effects Group — headed by Michael Lloyd and Steve Rundell — whose effects credits include Return to Oz, Outrageous Fortune and Ernest Saves Christmas. Midway through the project, the Buena Vista cosupervisors were joined by Harrison Ellenshaw — a veteran of such mega-effects projects as The Black Hole, Tron and Superman IV. Managing and coordinating the production were Carolyn Soper, Lynda Lemon, Brooke Breton and Melissa Taylor.

Tony Epper as Steve the Tramp. .

For Michael Lloyd, the first order of business was to lock down the 'look' of Dick Tracy. "Warren was pushing a non-comic book look originally. Our problem was that we had something that was supposed to have somewhat of a comic book feel to it, yet with real live people and real physical things. In an ordinary picture, we would paint a real surrounding; but what we had to come up with for Dick Tracy was a stylized look that not only worked with reality but blended into a stylized world. We bent the rules in the use of color and architecture."



Caglione and Drexler apply finishing touches to the Pruneface makeup worn by R.G. Armstrong.

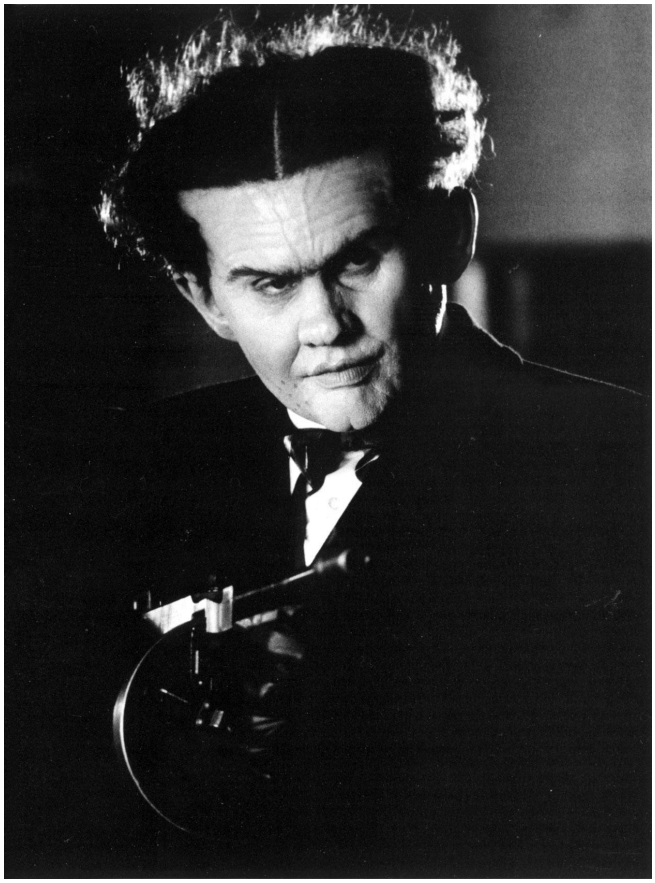
A large team was assembled to bend those rules. Selected as primary matte artists were Michele Moen and Paul Lasaine, each of whom painted twenty-two out of the fifty-five matte shots in the film. Noted book cover artist David Mattingly executed two sizable paintings, and assistant matte artist Lucy Tanashian rendered two smaller paintings. Six paintings were generated by Lloyd himself when he was not otherwise tied up in endless meetings to determine the look of the city — which had been affectionately dubbed 'Tracy Town' by Lasaine.

"The production design team wanted it to be fanciful and stylized," Lasaine noted, "but no one really knew what that meant. It was more of a catch phrase than anything else. We had a lot of leeway as to what we could do, ranging from glorified animation background paintings to absolutely undetectable photo-real matte shots. There was a lot of trial and error to find the right mixture. We would do something and get feedback from Warren. No one really knew exactly what was wanted well enough to lay down a written set of rules, so it became a process of pushing it one direction or another until Warren saw what he liked."

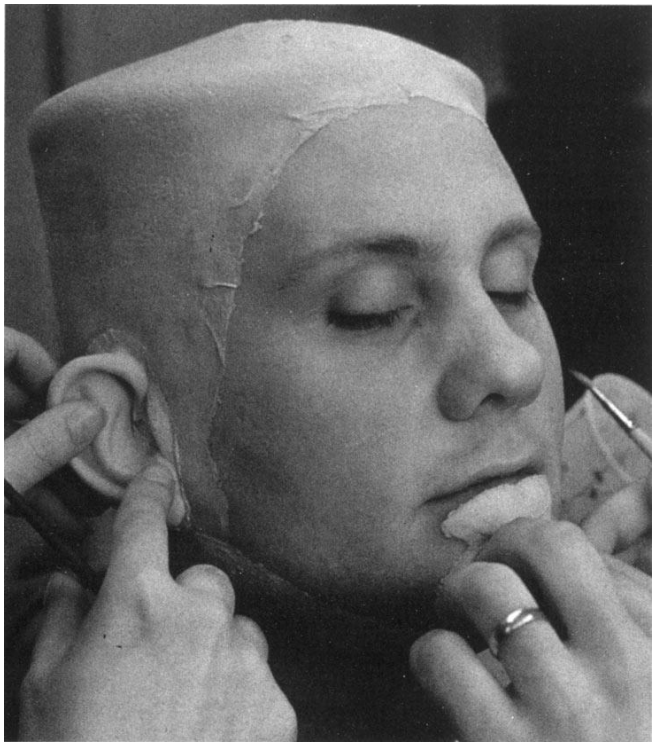
What Beatty liked was difficult to say — or more accurately, it was difficult for Beatty to say. Notorious through out the industry for his reluctance to verbally specify his directions, Beatty preferred to edit from an option of choices. Ellenshaw found Beatty's methods interesting. "He likes for you to debate the shot, present your side of the story. He likes to see different versions and then decide, or pick parts of each version and have you combine them for his judgement. He did not even like to discuss something that was not approaching finished work. He wants to hire good people who do the job and bring it to him as a finished item. That does not make it a fait accompli, though, because then it can get thrown right back in your face."

"It was like a big puzzle," elaborated Lloyd. "Warren is not a visual artist, per se, like a cinematographer or painter. He's a filmmaker and he hires you to add your piece to complete his picture. I think the success I had with Warren was in trying to really understand what he wanted. If he made a comment like 'Why don't you try blue or green' we had to figure out why he wanted to try those colors. Where did he ultimately want to go with it? I think maybe his 'indecision' comes when the people around him are not coming up with the proper idea. He's not going to say yes and endorse it — he may say nothing, and that becomes your clue that you're not quite there. You have to draw it out of him. A lot of times he did not really know what it was that felt wrong; but whatever it was, he would never accept something that was fifty-fifty. We just had to keep pursuing it."

Since Beatty tended to discard things that no longer seemed correct — such as several of Sylbert's carefully rendered matte shot illustrations — the matte department found themselves designing shots as well as executing them. The ongoing changes incurred in this process led Lloyd to an important decision — no



William Forsythe as the murderous Flattop.



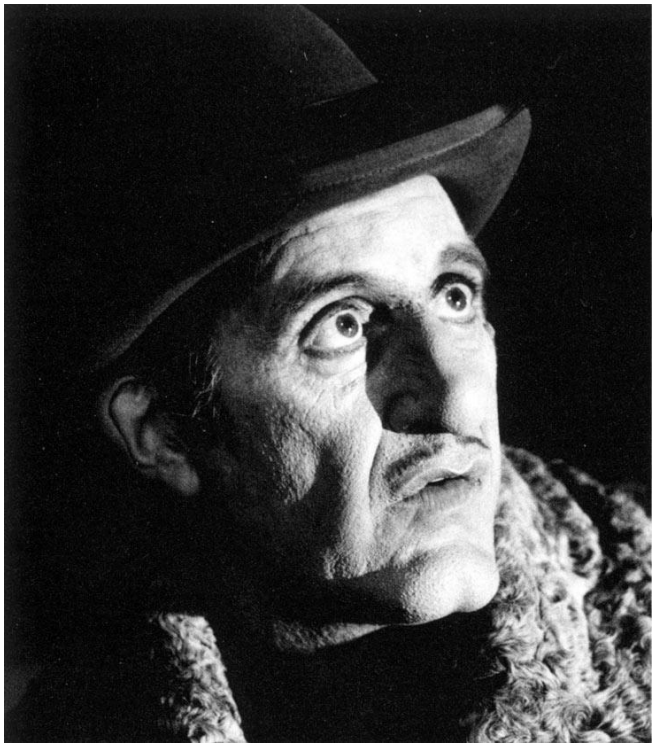
Fourteen overlapping prosthetic pieces were required to transform the actor into his character. Initial application time was four hours, although the process was streamlined during the production

original negative matte shots would be utilized on Dick Tracy, even though they produced the best result. It was determined that the second highest quality matte shots could be achieved by utilizing Vistavision live-action plates which would be reduced to four-perf YCM separations and then bipacked with new color negative — a process which enabled the composites to be redone as often as needed. While this approach would produce a generational loss of quality, it would essentially be offset by the use of the larger eight-perf format.

The bipack technique would serve well for the bulk of the matte shots intended for Dick Tracy. There are, however, limitations to the size to which Vistavision imagery can be reduced and still retain acceptable quality during the duping into four-perf. Many of the paintings required that live-action plates be reduced in size to only ten to twenty percent of the frame. In order to acquire the necessary resolution and detail, it was determined that YCM separations would be rear-projected into those paintings, which afforded the additional benefit of allowing camera moves on selected shots. The task of providing the matte department with all the separations fell to optical cameraman James Mann and lineup supervisor Bernie Gagliano.

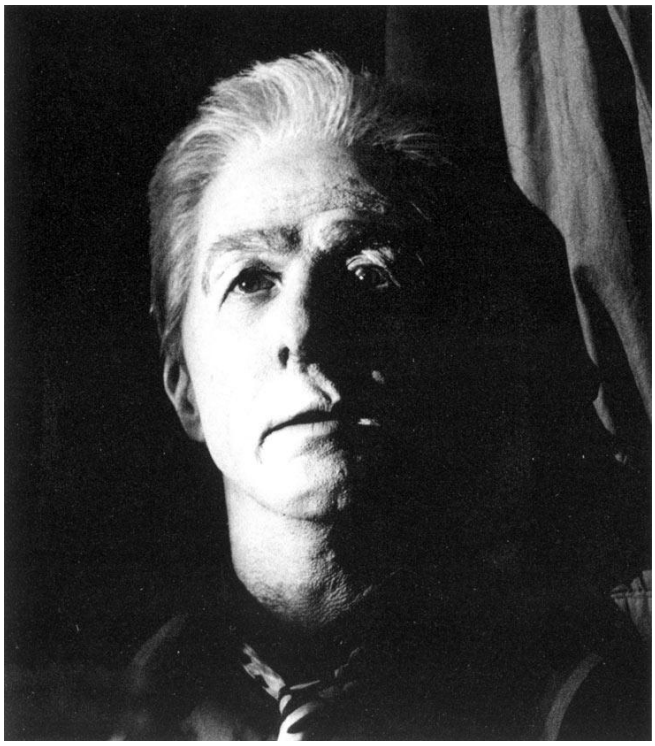
and eventually reduced to a more palatable hour and a half.

Hairstylist Lynda Gurasich attends to the application of a giant wig.



Al Pacino as Big Boy Caprice. Unlike the other villains, Big Boy on film bore little resemblance to his comic strip progenitor. Trying to develop his character inside and out, Pacino selected facial elements he liked from a collection of generic prosthetic pieces. Using those as a basis, Caglione and Drexler fashioned a complete prosthetic makeup for the actor.

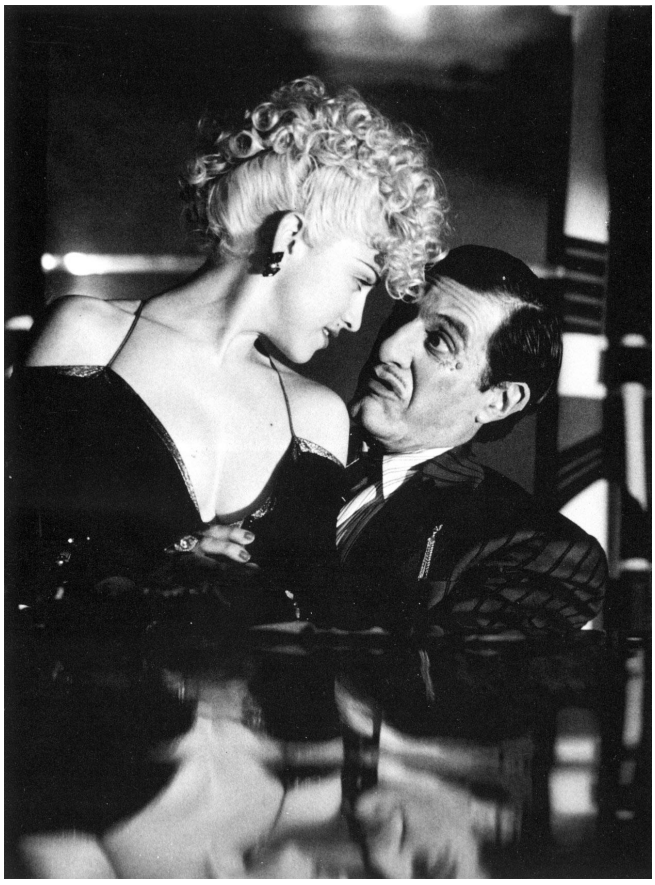
Though an official Dick Tracy bible was never finalized regarding the look of Tracy Town, the key had been found. “Architecturally,” said Lasaine, “the Tracy shots are classic matte paintings. They have all the proper perspective, actual physics of light and shadow, and atmospheric perspective. What makes them right for Tracy Town is that each shot is custom designed to make that particular view of the city tie into the live-action in an impossibly perfect composition ‘lit’ with Storaro-style lighting. That’s where things started to come together. We took our cues from what Storaro was doing — funky light sources and things that just did not mean anything. We said, ‘Hell, we’ll do it too!’ And it became the ingredient that made everything work — the crazy colors, especially.”



The duo had only five days to devise and create a makeup characterization for Dustin Hoffman as the incomprehensible Mumbles.

“The film has a different look that people are not used to seeing,” said Lloyd, “but it works. The key word is ‘balance.’ You go into a night club that’s lit with colored lights, for example, and the place has its own feel — you are used to it right away. But if somebody opens the door to the manager’s office, then you see this oasis of fluorescent normality, this tremendous contrast that your eye is drawn to. We did not want that to happen with the paintings. They had to feel right and balance the shot.”

More than anything that followed it, the first shot of Dick Tracy would set the tone of the film. If the audience did not buy Tracy Town, if the mood repulsed rather than invited, then all was lost. A botched opening shot would have been a stumbling block difficult for an audience to overcome. Beatty himself realized it once a rough cut of the movie had been assembled. As originally scripted and shot, Dick Tracy opened with a matte painting — an establishing shot of The Kid (Charlie Korsmo) rummaging through trash cans. The composite was straight forward and convincing. It was also dull. Beatty turned to his effects people for suggestions. Lloyd had one. “It



Big Boy Caprice —who has fellow mob boss Lips Manlis killed to usurp his nightclub — also moves

in on his late rival's girlfriend Breathless Mahoney (Madonna).

bothered me that the first time we saw Tracy was at the opera and things happen so swiftly after that. I came up with the idea of showing Tracy preparing to go to the opera. Warren altered that to just preparing to go out, but basically you see Tracy getting geared up — without seeing Warren's face because we wanted to gently lead into that. We cut to a shot of Tracy silhouetted in his doorway and then, with the camera climbing the side of the building, we reveal Tracy Town, pan across to the bad part of town and pick up the original shot of The Kid in the alley."

As is almost invariably the case in an effects film, this revised opening shot was one of the last things completed. The Buena Vista camera crew was deeply engaged producing the standard matte shots and was thus unavailable for addressing the new sequence. Hired to fill the gap was The Chandler Group, fresh from a stint on The Hunt for Red October. Camera operators and programmers Les Bernstein, Don Baker and Tim Angulo oversaw the installation of some portable motion control track and a Mechanical Concepts camera mover linked to a Tondreau motion control system. Miniatures were by Stetson Visual Services. Supervised by Lloyd, the Chandler team photographed two separate sections of buildings — the brownstone neighborhood of Dick Tracy and the industrialized district across town. The middle space between them would be bridged by a matte painting. Each miniature required three passes for optical — a beauty pass, a backlit matte pass and a 'sun' pass on a 5K lamp positioned several feet behind the last building. There were several additional passes on the brownstone section so that live-action could be seen in various windows, though these elements were eventually dropped. A process projector was positioned off to the side of the brownstone, with a small mirror used to bounce the image of Tracy walking out the door onto a small rear projection screen set into the tiny window.

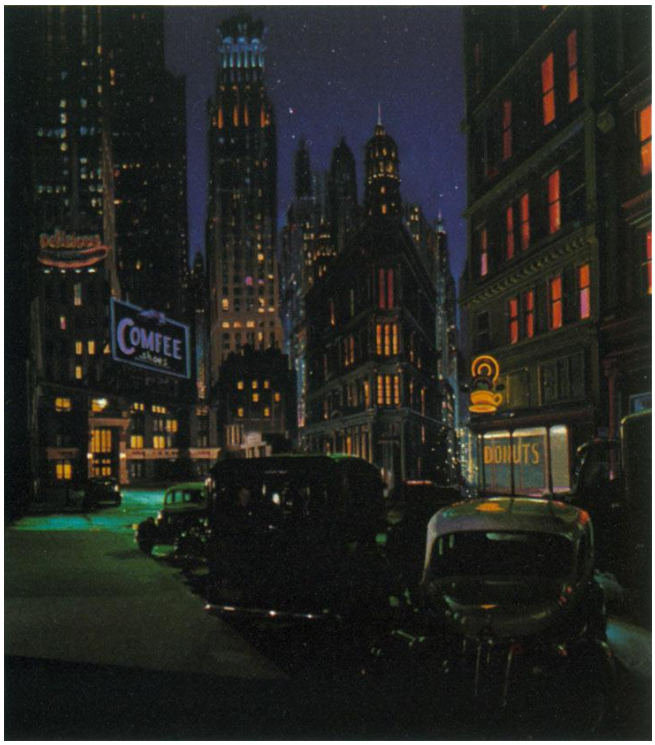
The next step was to generate the all-important establishing painting. With primary matte artists Lasaine and Moen overly busy, it became necessary to enlist reinforcements. David Mattingly — who had helped create The Black Hole — was brought in from New York and given the task. Undaunted by the comic book colors, he plunged into the huge twenty-four-foot-long painting which had already been laid out by Leon Harris. "I was not here during the early days when they were locking in the color scheme," Mattingly remarked, "but I found it fun to go with the flow of the show and play with all the lighting effects and color. Matte painting pays a lot of attention to the masses in the painting and the tonal value. If the tonal value is correct, then the specific details are a lot less important."

As the delivery deadline loomed, the entire matte staff was assembled for a marathon paint fest. Ellenshaw even brought in a ringer — his father, famed matte artist Peter Ellenshaw, who slammed into the painting without blinking an eye. "On Mary Poppins we had the same situation to a certain degree," recalled the senior Ellenshaw. "We romanticized London and made it almost comic book, but not quite so far as what they did with Dick Tracy. This was larger than life, but it was grown-up fantasy." The veteran painter blocked out the sky and city layout in two days while his fellow artists watched in admiration. "It was amazing," said Lasaine. "He whipped out the sky in an afternoon and it was he who came up with the bright magic hour colors. We used it as our color model."

With the painting complete, it was delivered to Disney's effects camera staff which consisted of Glenn Campbell, Stephen Brooks, David Hardberger, Dick Kendall, Brandy Hill and Philip Huff. Supervising the department was Peter Montgomery, whose three-year rise from effects animator to department head attested to his talents in the field. The opening shot fell to Montgomery and Brooks, who worked out a matching speed between the painting and the miniatures. Additional passes included several smoke elements and a miniature rear-projected train photographed during The Chandler Group stage shoot. Upon close examination, the rear-projected Tracy element proved to be lacking somewhat in resolution, so this was rephotographed on the matte stand by Montgomery.

The final piece of the puzzle was the original opening matte shot of The Kid in the alley. Shot as a static scene with bipack separations, it now had to be reshot with rear projection separations and required a matching pan move to tie it in to the tail of the industrial miniature. Once all the pieces were in hand, the shot was sent to optical where it was painstakingly assembled by optical supervisor Kevin Koneval. The final composite — a slow majestic tour of the city — was cut into the film, given a triumphant score by composer Danny Elfman, and received accolades from all who saw it. Then Lloyd received a call. "There had been some previews and Warren felt it was moving a little slowly," Lloyd stated. "It was too late to reshoot, but Warren was determined to chop some time off the opening so he asked for some skip-printing. We started testing. First we skipped every other frame, then every two. Finally we ended up printing one and skipping three." The shot wound up panning so quickly across the city that Elfman's original score had to be discarded and replaced with a faster theme.

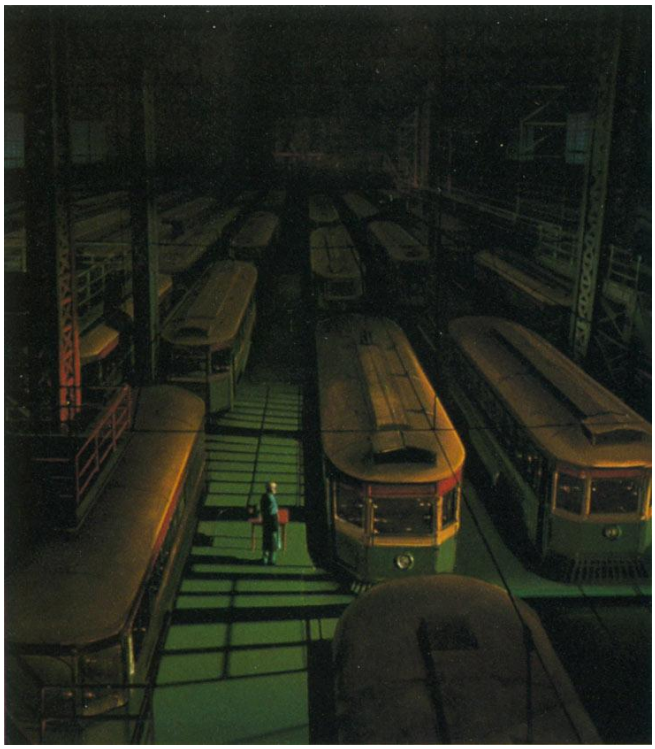
Multilevel composites were required for the opera house shots. A live-action plate of the diva was rear-projected into a Michele Moen matte painting of the stage and composited optically with separate sharp-focus elements of Tracy and Tess on one plane and audience members in front of them on another. With bluescreen problematic for the lighting scheme desired, Disney brought its sodium screen system out of mothballs for the traveling matte work.



In a glitzy matte shot rendered by Harrison Ellenshaw and Paul Lasaine, a paddywagon carrying Flattop and Itchy backs up to the police station.

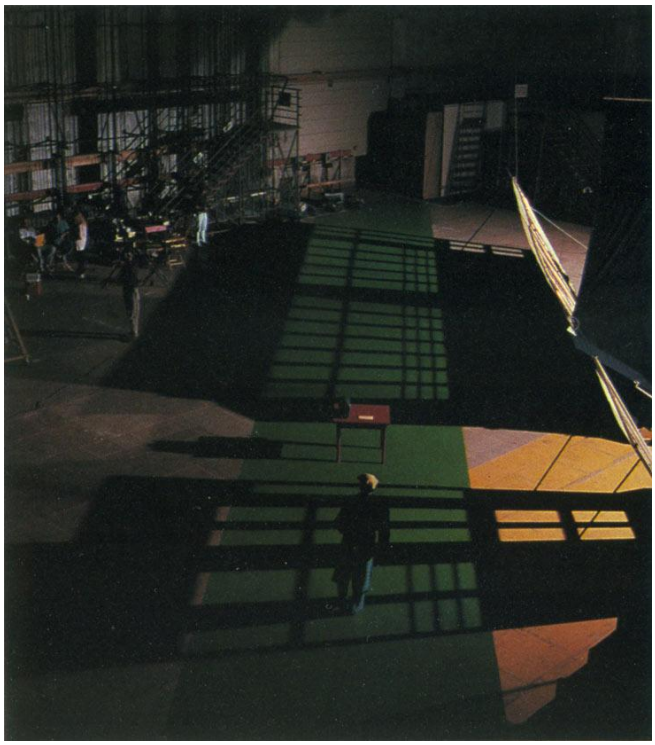
Michael Lloyd created an expressionistic nighttime setting outside a trolley car barn as 88 Keys arrives for his rendezvous with The Blank. Only the automobile and the building entryway are real.

With Tracy Town successfully established, the film follows The Kid as he witnesses the warehouse massacre of a criminal gang aligned with mob leader Lips Manlis (Paul Sorvino). Summoned to the scene via his wrist radio is Dick Tracy, who happens to be attending an opera with his girlfriend, Tess True heart (Glenne Headly). Since there were only two cuts of the opera, it made little sense to pack a set with dozens of extras and spend a great deal of time painting a cavernous opera house with Dick Tracy colors. Far better, it was reasoned, to do it with bluescreen. The approach made perfect sense until it was realized that Vittorio Storaro's lighting scheme called for the actors to be bathed in blue light during the second cut. Rather than alter Storaro's plans, Disney resurrected an ancient tool to facilitate the shots — the fabled sodium screen effects camera that had been a staple at the studio during the Sixties and Seventies when it was employed extensively on such projects as Mary Poppins, Pete's Dragon and the 'Love Bug' series.



Inside the car barn, 88 Keys makes his way through the parked trolley cars — another Lloyd painting.

Long ago supplanted by bluescreen, the sodium camera had only recently been reactivated under the auspices of cameraman Phil Huff. "Sodium had lain dormant for some time at the studio," recounted Huff. "We brought out the camera for Earth Girls Are Easy when a man in a furry blue suit had to be matted, and obviously bluescreen would not work. We did two shots and the results were good — which gave us confidence that we could revive the system. Sodium is a lot like bluescreen except that during the original stage photography we run two films in the camera — through a beam-splitting prism — and actually shoot a black-and-white matte at the same time we shoot the color foreground. This is done by having a special yellow screen that is additionally lit with sodium vapor lamps very similar to sodium street lights. This particular light is a monochromatic source with a very narrow spectrum — just a couple of wavelengths. Our camera has an old



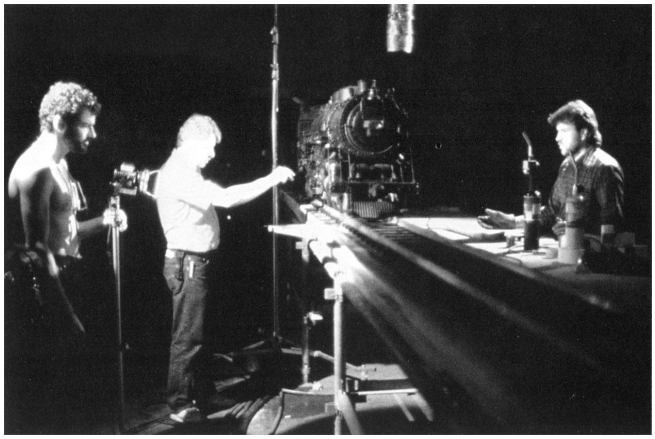
No set was constructed. The plate work was achieved solely with colored floor panels and backlit cutouts.

Technicolor three-strip movement with a didymium prism which separates the narrow band of sodium light and directs it to the black-and-white film while simultaneously directing everything but the sodium band onto the color film. So in essence, the color negative sees the action photographed against black whereas the black-and-white negative sees the action as photographed against white. And from that we can generate mattes with much less trouble and hold a lot more detail than is possible with bluescreen.”

One of the most complex effects sequences had Dick Tracy chasing The Kid through a railroad yard that did not exist Michael Lloyd airbrushes final details onto an illustration that will serve as a conceptual blueprint for an important shot of the two characters sprinting alongside an approaching locomotive.

For the small sliver of live-action in the shot, a painted flat representing the train station was erected on a stretch of railroad track and the actors were photographed running toward camera.

Kevin Koneval handled the matte making. “A misconception held by most people was that the filtration was perfect with sodium screen work — that the black-and-white film created a perfect cover matte and the color created a perfect image of actors against black so that all optical had to do was make a print off the black-and-white negative to create a perfect holdout matte. This was the legend — which like all legends had some small basis in truth. The matte pass does not have all the detail that you usually need for hair or blurs, but the body of the matte does come out of the black-and-white side. However, you cannot use it straight out of the soup because the separation is not there. You get very little density difference between your darks and your lights and the base fog is far too high. To get the detail, you have to approach it pretty much like bluescreen and just pull a black center off of the matte pass and then fit that to the color negative and pull a heavy cover matte off of that. The real difference from bluescreen is that you do not have quite as many steps. You come straight off an interpositive for your dupe element — you do not have to work with separations at all.”



At a warehouse in downtown Los Angeles, effects cinematographer Bill Neil recorded multiple motion control passes on a large-scale model train that were optically combined with the live-action material.

The key to the sodium process was the didymium filter prism — which like everything associated with the technique, carried its own store of legends. “Everyone was led to believe that there was only one prism,” recalled Huff. “The story was that the guy who originally built the prism — whose name seems to have vanished into history — through some fluke made one that was just perfect and then spent the rest of his life trying to duplicate it. Then he died, taking the recipe with him. So supposedly there was only one good prism and no others were possible. In fact, there are three prisms — the original ‘sacred’ prism, a spare prism which was manufactured by someone else and then a third prism which goes into an animation camera that was used to photograph Pete’s Dragon. That particular prism does not seem to work too well for live-action, but both of the others seem to work satisfactorily — though there are perceptable differences. The hero prism filters out more sodium light and delivers an image of the actors against a dark, almost black screen. The spare prism only turns the screen dark brown. It would be nice to have another prism, but the tricky part is the didymium coating on the beam-splitter. It is apparently very difficult to coat it just right so that you do not get any distortion in one image that you do not have in the other, which would then cause warping of the matte and create matte lines.”

There were other concerns during the testing of the prisms. One of the little known quirks of the sodium system is the requirement to hold neutral density filters on the black-and-white side of the prism to generate a correctly exposed matte. A tiny square of neutral material must be carefully cut and mounted on the prism surface just in front of the aperture plate. “Essentially,” said Huff, “you have to know the ASA of the film you are using, and then compensate with NDs

for the black-and-white versus the color stock. On Dick Tracy, we were using 5296 stock as well as 5247; so we had to make ND adjustments for the faster film." The only real drawback to the technique was its cumbersome nature. "Sodium is an entire system. You need the backing, the sodium lights, the light transformers, the camera cart, the custom lenses and the camera — which has the backhanded honor of regularly being voted the world's most difficult camera to thread. We had to drag everything over to Universal to shoot Dick Tracy, since Disney's stages were full at the time. Sodium is more or less portable, but it is not as simple as bluescreen where all you need is a regular camera and a screen."

Pursuant to his artistic vision, Beatty wanted the opera shots photographed with an unnatural depth of field. "Warren wanted the opera singers on the stage to be as sharp as Tracy and Tess in the foreground," elaborated Huff. "This also meant that the audience behind Tracy and Tess had to be sharp — which we found difficult to achieve with normal photography. We just did not have the depth of field to hold both the foreground actors and the next two rows of audience, so the two were shot separately as sodium elements and composited over a multiplane opera house matte painting which contained the live-action singers."

The opera house paintings were executed by Michele Moen. Taking a leave of absence from her home company — Boss Film Corporation — Moen had to undergo a crash course in painting with acrylics, the medium of choice at Disney. "It caused problems for me at first. Acrylics looked and felt harsh compared with oils. Oil-based paints have a softer, fluid feel — both in appearance and application — so I had to learn to play with acrylics. There were some nice things about it, though. For large areas I could use an airbrush for blending, which I did not use in oil. That helped a lot. There were other advantages as well. As paints dry they change color. Since acrylics dry right away, you know what the color shift is going to be within a minute or two, so you can account for that."

Mastering acrylics quickly, Moen created a multiplane sandwich of the opera stage and the theater itself. "We knew that there would only be two shots of the opera — one 'daytime' effect on stage and one 'nighttime' effect later. We figured that a generic foreground painting of the surrounding theater would work for both the day and night background paintings and save us some time." Though the foreground painting did save the matte artists from painting the detailed theater more than once, it also consumed a full day of camera time. Depth of field requirements for the shot entailed shooting the painting at f/16 with a four-second exposure. Ten hours were required to produce the final composite paintings, whereupon the negative went to optical for sodium compositing.

After leaving the opera to inspect the warehouse murders, Tracy returns to collect Tess. As they stroll down a lonely street, another massive matte painting is revealed as the camera pulls back and begins to pan over the city. Ultimately, it settles down into an establishing shot of Club Ritz, the nightclub headquarters of Lips Manlis. Although this painting was not quite as involved as the opening tour de force, it nonetheless contained many of the elements that would establish the official look of Tracy Town at night. Included in the fifteen-foot painting were elements such as rear-projected smoke, water reflections and — most importantly — the sparkle and twinkle of city lights and stars as affected by atmospheric haze. "We tried all sorts of tricks," recalled Harrison Ellenshaw. "Sometimes it would be something as simple as having a light go on in a

window of a midground building. It was not so much ‘make it look real’ as it was ‘give it more life.’ That was Warren’s thing: ‘Twinkle those stars!’ I liked the idea that for the first time we did not have to try to hide the matte shots. That is why I was so enthused about the show. I could see the potential for something very special and unique. These were all complex paintings with lots of multiple exposures. Some had as many as fifteen to eighteen passes.” The all important ‘twinkle pass’ was expedited by cameraman David Hardberger who suggested using a moire effect created by moving an interference pattern behind a sheet of backlit black litho paper studded with pinholes. An initial test proved successful and subsequently a custom-made twinkle element was produced for each nighttime matte painting.

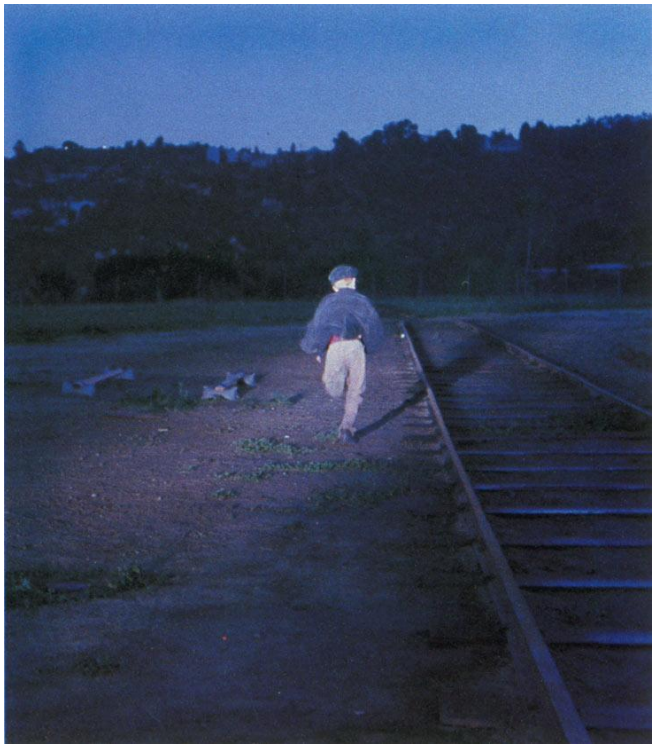
A test composite was made with the live-action runners and the miniature train in proper position within the frame. Then a cityscape painting was rendered by Paul Lasaine and enhanced with illuminated signs — some backlit transparencies and others rear-projected with animation. The final composite was assembled by Kevin Koneval.

A reverse angle had The Kid running adjacent to the tracks and crossing over a split second before the train rumbled past him.

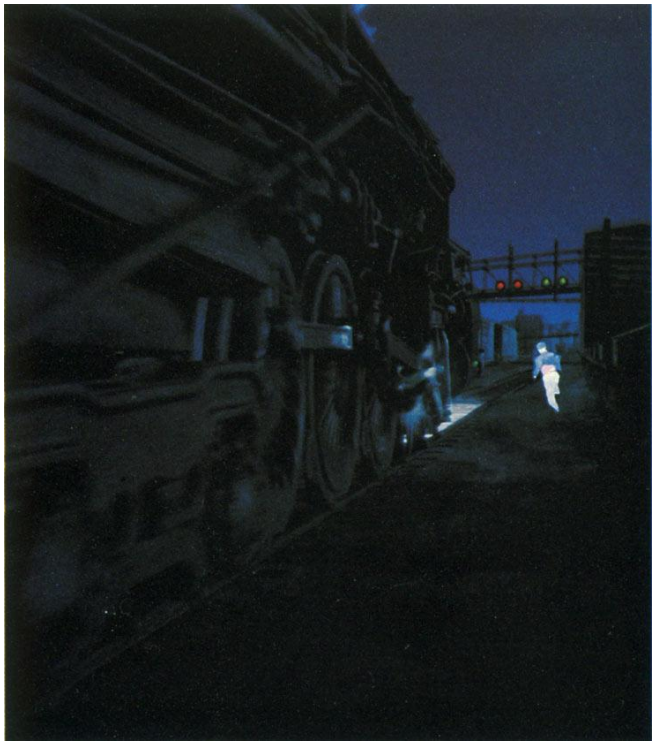
It is during the night that the luckless Lips Manlis goes for a swim and Tracy finds himself pursuing a young thief through the seedy sections of Tracy Town. Entering a train yard, The Kid boldly leaps in front of an onrushing train and eludes the detective who eventually tracks him to an old shack. The sequence is notable in that the entire chase — from the time Tracy meets The Kid to the encounter at the shack — was accomplished with matte paintings. With the exception of two location shots, the pursuit was photographed entirely on the Universal backlot and every cut had mattes involved. “That was one of the neat things about this film,” commented Lasaine. “It was the old style of making movies — stay on the lot where you have total control. The whole concept was to use matte paintings to add the production value where it was needed.”

Dick Tracy gained a great deal of production value from the train sequence, which combined live-action elements with elaborate matte paintings and miniatures. Modelmaker Mark Stetson supervised the construction of an expansive railroad yard miniature — one hundred fifty feet by thirty-five feet — which was assembled in a downtown Los Angeles warehouse. Stetson Visual Services also provided the train, which they acquired from a private collector.

Assigned the task of matching Storaro’s lighting was Bill Neil — a veteran director of miniature photography — who was assisted by Peter Montgomery. “We had a huge miniature,” Montgomery recounted. “The train ran on one hundred thirty feet of track. We had a steam engine, tender and several cars — each about ten feet long. The plan was to shoot the train under motion control with multiple speeds ranging from a few seconds per frame for the beauty pass to sixty frames per second for the smoke pass — and that is where it got hairy. How do you pull a one-ton train with precision at sixty frames per second and then get it to repeat again on the next pass? It



A spotlight — representing the locomotive headlamp — was directed at actor Charlie Korsmo during the plate photography. A subsequent design change in the shot required that The Kid be rotoscoped frame-by-frame and composited into another Paul Lasaine painting.



The miniature train was matted into the shot together with interactive light effects. When The

also had to stop and not crash into walls — which would have made the train's owner very unhappy." Robert Spurlock and Tom Valentine of Stetson Visual Services designed a closed loop cable that was attached to a chain that engaged a sprocket connected to a servo motor. Rigged thusly, the train — which was attached to the cable — could be positioned by computer and run back and forth over the length of track.

Kid darted in front of the engine, his rotoscope image simply disappeared behind the train matte. As the train recedes, a water tank and a pair of signal lights to the left of the caboose form a familiar Disney silhouette.

Matte artist Michele Moen at work on one of the twenty-two paintings she did for the film.

Effects camera supervisor Peter Montgomery — taking a light reading off one of the paintings — was in charge of matte photography and also doubled as camera operator on the model unit.

“We only had three shots to do with the train,” said Montgomery, “one with the train coming toward us and two with it going away. The one that approached camera was complicated by the fact that it came straight into camera. The question became, ‘Where do we put the camera with a train traveling ten feet a second?’ — which is how fast it had to be moving at the sixty-frames-per-second rate. ‘How do you get the camera out of the way in time?’ Ultimately we ended up with the camera off to the side of the track shooting into a mirror. In order to guarantee that the mirror always made it out of the way in time, we decided not to use anything mechanical or electrical because such systems are prone to failure.”

Artists at work in the matte painting room of the Buena Vista Visual Effects Group located on the Disney lot. Fifty-five fanciful matte shots invigorated the production — many of them combining not only live-action and paintings, but also foreground miniatures and animation.

Mirror alignment was critical to the entire setup. The multiple passes required to generate the steam and matte elements would be worthless if the mirror did not reregister exactly to its original position after being shifted to allow the train to pass. If the mirror were jostled out of position or broken, the two-week-long process required to complete each shot would have to begin anew. “The mirror was on a set of linear rails and basically it would just go to the end of the rails where there was a metal stopper to ensure its return to the same spot. Fred Albrecht, our key grip, would yank the mirror out of the way at the last second — which was a pretty frightening thing to watch at the speed the train was running.”

The mirror was not the only area of concern. Equally important was the need to stop the train before it rammed into the warehouse wall. “We were dragging a metal train that was over two feet tall and forty feet long, and its total weight was literally one ton. You cannot overcome that much mass and inertia easily. The motion control program did most of the work. It would accelerate the train up to speed and then, midway through, start accelerating the camera up to speed. It took a lot to get the camera up to sixty frames per second. The computer would run the two at a constant speed. Then, once the train was past the camera, it would slow both of them out. To additionally guarantee that the train would not go crashing into the wall that was literally at the end of the tracks, Tom Valentine rigged up a whole set of sandbags. Past a certain point there was a piece of metal attached to the cable that would start picking up these pairs of sandbags which were placed at three-foot intervals. Each bag weighed seventy-five to one hundred pounds, so it would ultimately pick up about eight hundred pounds of these things before it finally stopped. We only had to use the sandbag brakes once. Normally the train came to a fine stop on its own; but one day, while attempting to speed up production, we ran into a major problem. The reverse angle of the train was used in two separate cuts. It could have been shot as one uninterrupted scene except for the fact that Richard Marks, the editor, had requested slightly different speeds for the train in each shot. So they were set up as separate files in the computer. Bill Neil and I decided that maybe we could save some time by putting the two files together and running it as one continuous shot with the speed change included. Complicating things was the fact that we had the train speed up as it got further away in order

to create some perspective. I was alarmed by the realization that the train now had to accelerate about five times faster than we had ever done before. We tried it first at twenty-four frames per second. It was kind of spooky to watch the thing rev up, but it worked. Everyone got a little nervous when we decided to try it at forty-eight frames per second, even though we knew we would have to achieve sixty frames per second eventually.

“The train came flying down the tracks and tried to speed up into the second section of the move. The problem was that it had to speed up so fast that the servo motor could not handle it. When servo motors detect an error, they try to correct it; but sometimes, in doing so, they create an error in the other direction and the result is an oscillation, correcting back and forth — fast, slow, fast, slow. And that’s exactly what happened. The train started hiccupping wildly down the track and was sure to careen into the wall when Fred Albrecht hit the kill switch for the servo. Nothing seemed to happen, so he hit it again and suddenly realized, ‘Oh God, I think I just turned the servo back on,’ and he hit it a third time. By this point the train had picked up about eight hundred pounds of sandbags and came quietly to a stop. Once we started breathing again, we separated the files and shot them individually.”

Overcoming this brief reversal of fortune, the warehouse crew churned out several different elements for the optical department. In addition to the beauty pass, the shots required a headlight beam shot in smoke, a passenger train interior light pass, the matte pass and the steam engine passes. Then there were two areas of the train that emitted steam. The first was the piston exhaust near the wheels. “We shot that at twenty-four frames per second,” recalled Montgomery, “and we actually used the boiler on the train. We would fire it up and shoot the steam past dry ice to produce nice white steam jets. Then Mark Cane, our gaffer, and some of the model shop guys rigged up portable electric lights to illuminate the smoke from behind for photography.” The second source was the train’s smokestack. Since the crew was not using the real engine, the smoke was produced artificially with pyrotechnics. “The pyro produced thick smoke which was combined with compressed air to force it out of the stack and give it some volume. That was the pass we had to shoot at sixty frames per second.”

The oncoming shot of the train was eventually combined into an elaborate composite which contained the live-action Tracy and Kid as they raced along a set of train tracks, the miniature train and train yard and a connecting matte painting that extended above the scene to reveal Tracy Town looming over the entire setting. Unlike most of the matte paintings in Dick Tracy, the live-action elements for the train sequence were composited optically rather than on the matte stand. “We took the live-action element” explained Kevin Koneval, “because we had to juggle the size and position of the plate to alter the vanishing point — which had to happen for the train side, too. There was also quite a bit of roto for Tracy’s flapping coat. For the reverse angle of The Kid hopping in front of the train, the character ended up being articulately rotoscoped because we replaced the entire reverse angle with a painting. The Kid is the only real thing in that cut. When he runs in front of the train, he is simply disappearing behind the train matte.”

Once the decision was made to drop the actual background for the reverse angle of the train, it fell to Paul Lasaine to create a convincing matte painting rendition of the train yard. In addition, Montgomery had to fashion a soft-edged glow pass that wiped along the side of a painted boxcar and tied in the headlight pass from the miniature train. The articulate roto required to isolate The Kid from the original background plate was painstakingly accomplished by Linda Oda and Allen Gonzales. Sharp-eyed viewers might notice that as the train exits the scene, an unmistakable silhouette of Mickey Mouse can be seen, formed by train crossing lights and a structure in the distance. “In the time-honored tradition,” noted Lasaine, “there are some very subtle sight gags in a lot of the paintings. None that you would notice and ruin a shot —just a little something extra in the frame. You can see Batman in a couple of shots made to look like building silhouettes. There are Mickey Mouse water towers — complete with ears — Mickey shadows on walls, Mickey puddles on the ground and so forth.”

A clandestine rendezvous between Dick Tracy and Breathless Mahoney employed a live-action plate of the actors shot against light reflections on water. Everything above the waterline was painted by Michael Lloyd — as were foreground pilings and lateral extensions of the dock to widen the shot.

More than just nighttime city shots were given the full matte treatment For a scene of Tess Trueheart driving to her home, a plate was photographed with the sun low on the horizon and the sky masked out to eliminate lens flares. The road was then isolated with a matte and surrounded entirely with another Michael Lloyd painting.

Many of the subtle camera and painting tricks that brought the paintings to life pass equally unnoticed. Some shots feature car headlights glinting through distant trees, blinking red lights on the spires of tall buildings and a multitude of ‘neon’ signs and marquee chase lights. “Originally there were supposed to be absolutely no billboards in any of the city shots,” stated Lasaine. “No lettering at all. Then Warren wanted generic signs on certain buildings, like ‘Sugar Mill’ or ‘Hospital’ — no personal pronouns allowed. You could not do ‘Joe’s Pharmacy’ or anything like that. Certainly no advertisements. Then they decided they did want advertisements, but it had to be generic things like ‘Buy a Car’ with a picture of a car. Next they wanted us to come up with phony companies and generic billboards and signs. Then they decided to go with real companies and have a little product placement, but that did not happen either. So we went all around the world on the signs.”

The final versions of the animated ‘neon’ signs were backlit lithos photographed by cameraman Glenn Campbell, who in addition to shooting paintings was responsible for recording Dick

Tracy's live-action plates. The final sign elements were rear-projected into paintings or added by optical into some of the more complex matte shots. With all the multiple passes and bipacking of elements on the matte stand, however, the line between the optical printer and the matte camera became quite indistinct. "For simple shots there is almost no difference," noted Lasaine. "The matte stand uses the backlight for exposing YCM separations, just like a printer. The only difference is we can introduce large-scale elements like paintings and miniatures at the same time. But a lot of our stuff was pretty subtle. We had a shot where The Kid hitches a ride on the back of a police car, and over on the right-hand side of the street is a theater. We added chase lights around the theater marquee by making an animated hi-con element complete with built-in holdout mattes that we could bipack with a yellow filter, burning in the lights. The car drives in front of it and it looks completely natural, but it is a prime example of how effects can enhance a shot without drawing attention to themselves."

The subtle details injected into the paintings frequently took on a life of their own. A shot featuring a rare daytime exterior painting became a major production, belying its apparent simplicity. As The Kid scampers out of a haberdashery in his underwear, Tracy collars him on the sidewalk and lectures him briefly under an elevated train platform. "It was supposed to be a throw-away shot," explained Lasaine, "but it became quite involved. The plan was to shoot it early in the morning; but the principal live-action photography took longer than anticipated, thus pushing the matte plate photography well into the afternoon. Normally this would have been of no consequence, but the sun had risen to a point that it illuminated the entire street. We realized that our painted el train platform would not have a corresponding shadow on the ground and would look wrong. So we had to figure out a way to put a shadow in. We did it as a neutral density trick. I painted a transparent shadow on the live-action window of the matte painting; and when we exposed the separations, that ND area held back the full exposure, which created a darkened street. I had to paint it because it had to be soft-edged on the ground and also hard-edged as it fit behind live-action elements in the foreground.

"The original concept of the film was that all the streets were going to be deserted — very Edward Hopperesque and minimal. Then Warren decided that he did not want that look, but the plate in question had already been shot with a bare minimum of people. We needed something to spruce up the shot, so we came up with the el train passing overhead and interrupting beams of light cast by the sun. Peter Montgomery and I brainstormed the concept of using real beams of light in a smoke environment. We figured it would be easy because we would not have to show a real train since we were underneath the tracks. All we needed was the shadow of the train and light beams. So Peter and I built a miniature smoke tank out of several matte glasses — just slapped it together for this one element. Using a lineup clip in the camera, we determined the proper angles and matched the path of the painted train tracks with a forced perspective black cardboard track. Then Glenn Campbell and Peter rigged up a train cutout that was pulled along through a slot under motion control. It was amazing how well it worked."

Unfortunately, not well enough. Running into trouble with smoke dissipating during the shot, Campbell and Montgomery abandoned the beam photography approach in favor of another. "It was a six-hour shot and we did not have time to spend on such a throwaway element," Lasaine continued, "so we used a painted element airbrushed by Lucy Tanashian instead. Peter

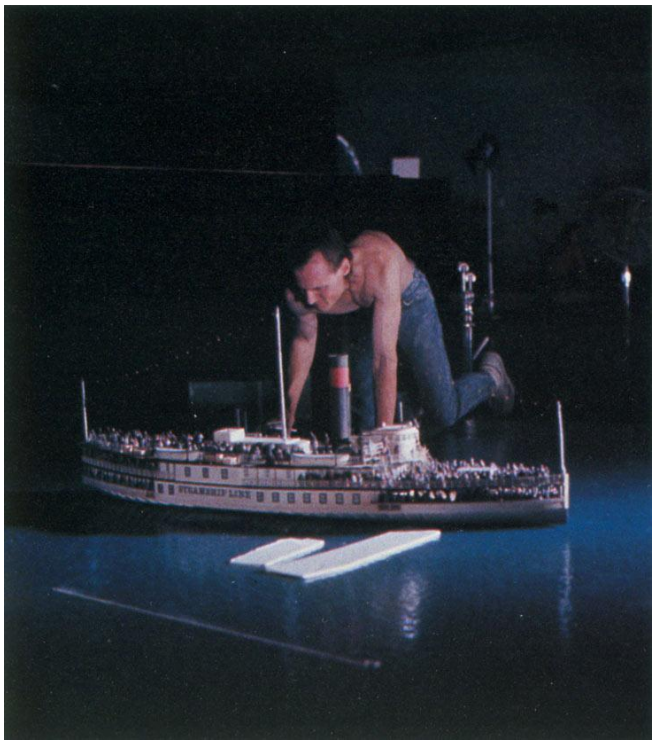
bipacked moving holdout mattes in-camera to create the effect. In addition to the sunbeams, Glenn suggested that we paint a special burn-in section of sunlit trestle. He then bipacked animated wipes over that element, which was double-exposed over the painting to indicate the passing shadow of the train cast onto the trestle framework. The physical 'body' of the train was just another series of bipack mattes."

Some of the tricks employed by the matte crew were equally subtle, but more visible on screen. As Tess enters her greenhouse, unaware that it is a trap, an ominous figure — The Blank — enters frame to watch her. Beatty was uncertain as to whether the featureless villain should actually be seen, and ordered takes shot with and without. It was a fortuitous decision. "All we were supposed to do was add Tracy Town to the background," recalled Michele Moen. "But after a few screenings, they suddenly noticed a keystoning effect in the live-action plate. The wide-angle lens that was used made the upper corner of the brick building curve noticeably, and Warren wanted it removed. This was easy; but it meant that we could not use the take that included The Blank, because he stepped in front of the curved wall."

Rotoscoping was the most obvious solution, but not in this case where the subject moved into position and stopped. Roto work never looks good on a static actor, particularly when he is large in the frame and certain to attract scrutiny. With that option closed, an alternative solution was required. Fortunately, there existed the single take of the greenhouse scene without The Blank included. This meant that the greenhouse could be composited as a conventional matte shot and then utilized as a background element on the optical printer. All that was required was a new Blank element, which proved a bit more difficult to generate than expected. Since only a silhouette was needed, the matte crew dressed a team member in coat and hat, staging his movements in front of a white screen. Regrettably, none of the takes seemed to have quite the right action. After several disappointing attempts, Peter Montgomery solved the problem by fashioning a cardboard cutout and moving it by hand. The resulting element was composited by optical cameraman Douglas Ulm, who softened the edges of the silhouette on the printer.

As things heat up between Tracy and the mob, more than a little heat is generated between Tracy and nightclub chanteuse Breathless Mahoney — portrayed by pop diva Madonna. A late-night meeting on a waterfront dock gave them a chance to express their feelings and provided the matte department a chance to play. Lloyd and Ellenshaw extended the scale of the shot into a much grander vista than had been originally envisioned. "Mike thought up the idea of extending Madonna's entrance to make the shot wider and give it some scale," Ellenshaw related. "As originally designed, Breathless entered the shot from the left-hand side of the screen, which did not give us a lot of room to see the dock setting. The problem was that if we reduced the live-action plate, we would see her enter from thin air. Mike painted a large wooden piling and tall pole that blocked out the plate's left frame line and allowed Madonna to appear as though she was stepping out from behind the piling. Then we took the same live-action plate and repositioned it to the other side of the piling, which now allowed her to still enter cleanly from the new extended left side of the shot."

The climax of the film takes place on and around a drawbridge which opens to allow passage of a sightseeing boat just moments before Big Boy Caprice attempts to cross it in his flight from Dick Tracy and the forces of justice. Since the logistics of using a real bridge were daunting, the sequence was accomplished almost exclusively with miniatures and matte paintings. The bridge and its immediate surroundings were constructed by Stetson Visual Services.



The model tour boat — with tiny passengers motorized for minimal articulation — was mounted on tracks and advanced under motion control. Rippled plexiglass — which provided a convincing simulation of water — was similarly mounted and moved in the opposing direction.

Matte painting backgrounds and superimposed fireworks completed the illusion.

Working closely with cameraman Stephen Brooks, Ellenshaw manipulated the rear-projected Madonna plate, deftly adjusting the size and position until the illusion was achieved. “I made a cutout of her from the right side of the pole, moved the projector over, laid down the cutout on the glass and more or less fit her image to the size she would have been on the left side of the pole if she had really walked through. Then it was a matter of running the projector for part A on the left side as she entered, walked behind the pole and vanished. Next we would backwind, reposition the image to the right side of the pole and pick her up for part B as she entered from behind the pole and continued on with the scene as originally photographed.” In addition to the Madonna repositioning, the real water reflections included in the live-action plate were isolated and rear-projected under the dock, giving the landlocked set piece the effect of having an extension over the water. A slow motion control move-in was the final touch, accenting the waterfront tete-a-tete.

When Tracy rejects the overtures of Breathless, things rapidly deteriorate for the virtuous detective. In quick succession Tess is kidnapped, Tracy is framed for murder and jailed while Big Boy Caprice enjoys the run of the city. Ultimately, in accordance with the major thrust of Chester Gould’s inspirational comic strip, Tracy is vindicated and sets out to cash in Big Boy’s account. During a furious gun battle, Big Boy escapes with Tess in tow and Tracy in hot pursuit. The chase — which would progress to an elevated drawbridge and climax within its gearhouse — would employ every trick in the Disney visual effects arsenal. “For the bulk of the film,” stated Lasaine, “we were taking shots that were little forty-foot-square areas on a stage and turning them into entire panoramas, just using a paintbrush. But then we came to the big climax of the movie, and virtually every shot is an effects shot with paintings and miniatures.”

The drawbridge sequence that caps the film is a triumph of hard labor by the effects team. Though there were several local bridges that might have served as the set, the logistics of closing them for extended filming — not to mention the prohibitive cost of Dick Tracy-style set decorating — made the use of local structures a low priority option. Thus, with the exception of a seventy-foot-long set that housed the concrete road and staircase entrance, the bridge was created entirely with matte paintings and a detailed miniature built by Stetson Visual Services. The drawbridge miniature was photographed almost simultaneously with the train material at the Los Angeles warehouse manned by Bill Neil and Peter Montgomery.

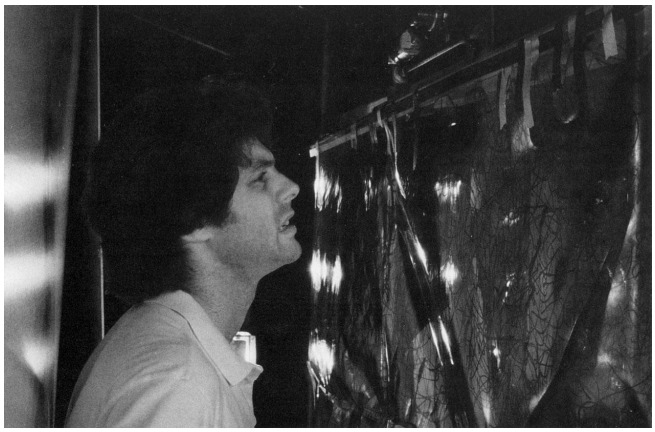
“The miniature was designed to be a working drawbridge,” noted Montgomery. “It actually had stepper motors in it and could move up and down. Editorial could not make up their minds about how they wanted to see this thing happen, so what they wanted us to do was shoot every cut to the full length of the bridge cycle, from fully closed to fully open. That meant each shot would have been a full minute of screen time. There was no way we could afford to do that because we had lots of tiny lights with four- to six-second exposures per frame, and it would

have taken forever to shoot. We wound up shooting ten cuts of the bridge with the road tilted to specific angles. It never moves on screen — not once — and no one has ever noticed." Additional shots of the non-elevated bridge were produced as rear projection plates for inclusion into several matte shots sprinkled throughout the film. The bulk of the shots were produced for the end sequence, which also featured a holiday excursion boat loaded with tourists. Stetson modelmakers Dennis Schultz and Ian Hunter included miniature people connected to motorized strips that wiggled the figures en masse.

An important consideration in the photography of the model was literally water under the bridge. Long the bane of effects photography, real water is exceedingly difficult to miniaturize, stubbornly revealing its true scale against all but the largest of models. Mark Stetson sidestepped the limitations of real water by substituting a twenty-by-twenty-foot piece of rippled plexiglass. "The plexiglass worked like a champ," enthused Montgomery. "Since it was a night shot, we had all these miniature lights from the bridge and boat reflecting into the water that flowed under the models. Stetson had the boat and the plexiglass on two sets of parallel motion control track with drivers. The water moved upstream and the boat moved downstream, riding through a slot which was cut into the plexiglass. The illusion was superb, because you only saw the water as rippled reflections. Bill Neil's lighting hid the slot and created some wonderful Storaro-style colored highlights in the water."

Photography of the bridge entailed the usual number of separate element passes endemic to miniatures. "We had beauty passes, little red and green marker lights, the tiny bridge lights and a 'light pool' pass — where the modelmakers put tiny metal domes on the street lamps so that little pools of light would be cast onto the street — and, of course, the reflection pass. We would turn off everything except the miniature lights in the boat and bridge, and we would shoot just the reflections of the lights in the water at one stop hotter than normal. We figured that we might need to manipulate the exposure of that particular element later on — which turned out to be more true than we ever supposed, but not in the way we had assumed. In the end, none of the extra passes were used. The straight beauty pass contained all the information and looked good, so we didn't need the other elements at all."

Murphy's Law states that anything that can go wrong will. Visual effects artists are more familiar with the corollary which states that any element not shot during initial photography will be required three months later. Effects editors Rob Yamamoto and Kelly Tartan were pleasantly surprised that this corollary was not enforced during the bridge photography. "The other passes were all insurance," continued Montgomery. "We never needed to play with them. But the water reflection element that we used incessantly. We had a cut that we used to put water reflections in matte paintings all throughout the show. There must have been ten or twelve shots that had water



Most of the nighttime matte shots featured twinkling stars. Camera operator Stephen Brooks examines a moire rig — essentially an interference pattern behind a backlit sheet of black paper studded with pinholes — devised by fellow

in them, and almost every one of them used the same set of reflections — sometimes two or three times in the same shot. It just looked great. We even filtered it with color gels and used it as the basis for some of the fireworks reflections, fading it in and out as a burn-in over our painted water.”

Matthews produced low-resolution boats as it appeared in the motion control passes over the bridge to isolate tiny practical lights for subsequent manipulation and enhancement it was later determined that the principal beauty passes were more than adequate just as photographed.

A minor plot point nearly lost in the shuffle is the fact that the climax occurs during the celebration of New Year’s Eve. Warren Beatty wanted the bridge sequence to feature an ongoing fireworks display as Tracy and Big Boy begin their final confrontation. Ruling out animated fireworks, the effects team instead employed 65mm stock footage which was converted into continuous tone and high-contrast lithos by Bernie Gagliano, then resized and rephotographed on the animation stand by Brandy Hill. Included as well was the animation of Allen Gonzales, who created ‘shooters’ depicting the pyrotechnics rising from launchers on the boat. Failing embers visible in certain cuts were created by enlarging elements of the actual fireworks bursts, then isolating and exposing them with colored gels. Completed elements were composited by Kevin Koneval.

Since virtually every exterior shot is also an effects shot, it was necessary to optically composite the actors into the scenes. Eschewing the cumbersome sodium system, the decision was made to utilize the standard bluescreen process which was better suited to the minimal room remaining behind the large set piece of the bridge. Just as Storaro’s lighting caused consternation for the makeup crew, so too did Koneval find himself dealing with camera related complications. For actress Glenne Headly’s bluescreen closeups, Storaro chose to add a light diffusion to the lens. “Diffusion is something you just do not do with bluescreen,” stated Koneval. “Otherwise, you have to keep playing with the size of the mattes forever. With diffusion, Tess’ edges blurred instead of resolving into a nice clean separation between her and the bluescreen — which is the entire point of the process.” Compounding the difficulties in the shot, Beatty decided to throw the background of the Tess closeups out of focus. It was an unusual decision in that every other cut in the sequence was razor-sharp, making the shot even more noticeable. “It helped that Tess was ultimately comped over a fairly dark background, but in the earlier versions we could see that the mattes were indeed working.”

With both The Blank and Big Boy vanquished, Tracy settles down for a little tranquility with Tess and The Kid. Moments be- fore the romantically reticent detective can propose to his long-suffering sweetheart, the ever-present wrist radio summons him to yet another unfolding drama. Racing away into the early dawn, Tracy disappears into the final shot of Tracy Town.

Execution of the final shot fell to Peter Montgomery and Stephen Brooks, who had likewise generated the opening shot. Working with a large format matte painting created by Michael Lloyd, the camera crew labored for many weeks on the final composite. “It was an unusual live-action plate in that the street changed color during the course of the shot,” observed Montgomery. “Vittorio Storaro lined the rooftops with yellow-gelled jumbo lights on a rheostat dimmer board. As the car drove up the street, Vittorio brought up the intensity of the lights, which reflected into the wet pavement and created the impression of the sun rising up and illuminating the street.”

The Chandler Group — supervised by Lloyd — generated a sunrise element timed to match the live-action plate. Photographed in heavy smoke, the sun element also contained a traveling train silhouette to add an extra touch of life to the shot. Unfortunately, it was discovered that the train's scale was a bit too large for the painting. "We could not do a reduction in optical," stated Montgomery, "because the train was a built-in component of the smoky sun element. If we shrank that element, the edges of the original frame would be visible, defined by the smoke. Mike suggested using an anamorphic lens to stretch the image and make the train thinner. Technically it also stretched out the sun, but it was so diffused that it didn't hurt at all. That gave us exactly what we needed."

What the crew did not need was a decision to add the end title card over the final matte shot. To maintain the highest quality, the title would require bipacking over the original painting photography — a simple enough task until complicated by editorial revisions. The title was too large, too small, too high, too low. The exhausted matte crew finished the final composite only one week before the gala premiere of the film, which went on to become one of the top five moneymakers of the summer. Invariably singled out for praise were the unusual images of Tracy Town. "If you stop and analyze it," noted Michael Lloyd, "there is not one shot in the film that was there simply to get rid of a C-stand or a ladder — which is what a lot of matte shots are all about. Each and every shot was a major set piece which had to work integrally with the film." The challenge was both exciting and frightening. "We walked a thin line," concluded Harrison Ellenshaw. "We had normal architecture juxtaposed with very stylized graphic artwork. You could never be certain that it was going to work, but we knew we had a lock on it when Warren saw one of the shots and said: 'God, this is so weird. I'd love to live there.'" Now and forever — on film at least — he does.

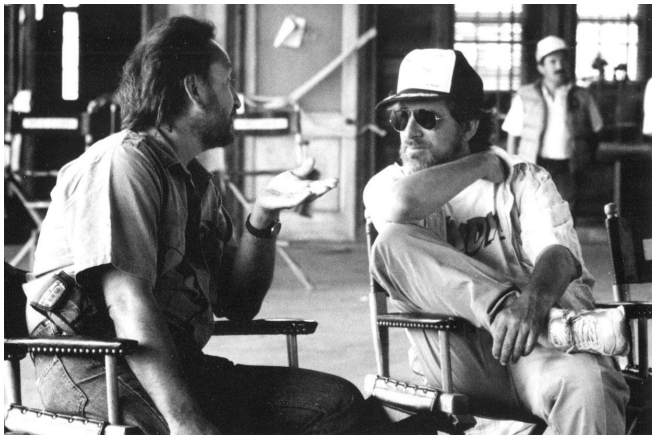
Dick Tracy photographs copyright © 1990 by Touchstone Pictures. All rights reserved. Unit still photography by Peter Sorel. Special thanks to Howard Green and Albe Albelo.

Playing with Fire

image

article by
Kevin Martin

Derived from his warm childhood memories of A Guy Named Joe, director Steven Spielberg's Always seems to be more a tribute to the 1943 original than a remake of it. Set in another time and taking place under considerably different conditions, Always remains faithful in spirit — if not in detail — to the wartime melodrama that inspired it. The Victor Fleming original followed the exploits of a World War II bomber pilot (Spencer Tracy) who sacrifices himself on a mission in order to save his buddies. He then finds himself in heaven where he is assigned a new mission — to return to earth and help an unseasoned young pilot. The only catch — he will be there in spirit only. As a period tearjerker, A Guy named Joe has a number of effective moments, but for the most part the passage of time has been less than kind to it.



Love transcends death in the Steven Spielberg production of Always, an affectionate remake of A Guy Named Joe in which the adventure and romance of the vintage original were retained while the principal characters were transposed from World War II bomber pilots to contemporary aerial firefighters. Cinematographer Mikael Salomon confers with Spielberg on the set

The challenge for Spielberg was to find a way of bringing his version of the story to life without sacrificing the virtues of the original. The project had a long development history — nearly ten years — during which time the script was passed through a succession of hands. Among the writers involved in shaping the story were Jerry Belson — whose contribution would eventually earn him solo screen credit — Rain Man cowriter Ronald Bass, playwright Tom Stoppard and the late Diane Thomas. The time period in which the film would be set was also subject to change. Spielberg had initially planned that the film — like its predecessor—would be set during the second World War. But after directing Empire of the Sun — another World War II period piece — he decided instead to transplant Always to modern day, in the process transforming the key pilot characters from military aviators into airborne firefighters. In

Industrial Light and Magic was engaged to produce effects for two essential sequences involving low-level flying maneuvers over raging forest fires. Ruling out opticals as a practical means of achieving the footage desired, the effects unit opted instead for large-scale miniatures photographed in actual wildfire environments. After attempts to employ radio-controlled aircraft proved unfruitful, a truck-mounted crane rig was fabricated to fly the fifth-scale models.

place of Axis war-planes and guns, these pilots would do battle against natural adversaries in the form of blazing forest fires.

The lead character — played by Spielberg alter ego Richard Dreyfuss — would be a guy named Pete Sandich, an aerial daredevil who thrives on danger and appears to be having the time of his life fighting forest fires from the air. He shares a tremendous esprit de corps with the other members of the squad and he is also in love — though he resists commitment — with the fiery Dorinda Durston (Holly Hunter) who urges him to quit fire-fighting before his luck runs out. Reluctantly, Pete agrees to stop flying the fire lines and settle down — but before he can act on his decision, tragedy strikes. Like his counterpart in the original film, Pete Sandich dies in the air after saving a friend — in this instance, his buddy Al Yackey (John Goodman). But Pete finds that life goes on — after a fashion — and that inspiration and muse are actually one and the same. In fact, he is called upon to serve as muse to another less-talented flier who also happens to be stepping into his shoes with Dorinda. In torment, Pete discovers that he cannot find it within himself to relinquish Dorinda a second time.

With massive forest fires and exploding aircraft essential screen elements, it was clear that the project would require extensive preplanning and first-rate effects work. It was therefore only logical that Industrial Light and Magic — a frequent collaborator on Spielberg projects — would be involved. Veteran ILM art director Joe Johnston — after a leave of absence from the facility to direct Honey, I Shrunk the Kids — would ultimately direct the essential model unit aerial shoot. But before that, there were many meetings during the film's protracted development phase. "Years ago," recalled effects producer Jim Morris, "Joe began doing sketches and designing shots for the two major flying sequences envisioned for the film. Later, when it became a 'go' project, he storyboarded both sequences, drawing out shots for the live-action as well as the effects scenes. Once Steven was satisfied with the boards, we went ahead and began to develop methods for executing the needed shots."

It was immediately determined that motion control would be a poor choice for realizing most of the model shots. "Back when he made 1941," Morris recalled, "Steven had some success using aircraft miniatures that were flown on wires through miniature sets. For Always, there were going to be many shots of planes against light-colored skies, and most of those would require a variety of interactive occurrences as the aircraft flew through. The models would appear in situations of variable visibility, with embers shooting up out of the forest fire as well as exploding trees and the like. Combining these elements believably made using any sort of traditional optical approach out of the question." Consequently, the decision was made to do the necessary model shots in-camera.

This was not the first time that ILM had tried reinventing the tried-and-true technique of wire-hung models shot single-pass in 'live' environments. In Star Trek IV, they had crashed models of a Klingon spacecraft into a simulated San Francisco bay. Some of the scenes in Innerspace were shot with miniature submarines in actual liquid-filled settings. And a considerable number of shots in Batteries Not Included were achieved by maneuvering tiny saucers on wires during the main unit shoot with live human actors. But this time the models would be interacting with fire — and they would have to fly.

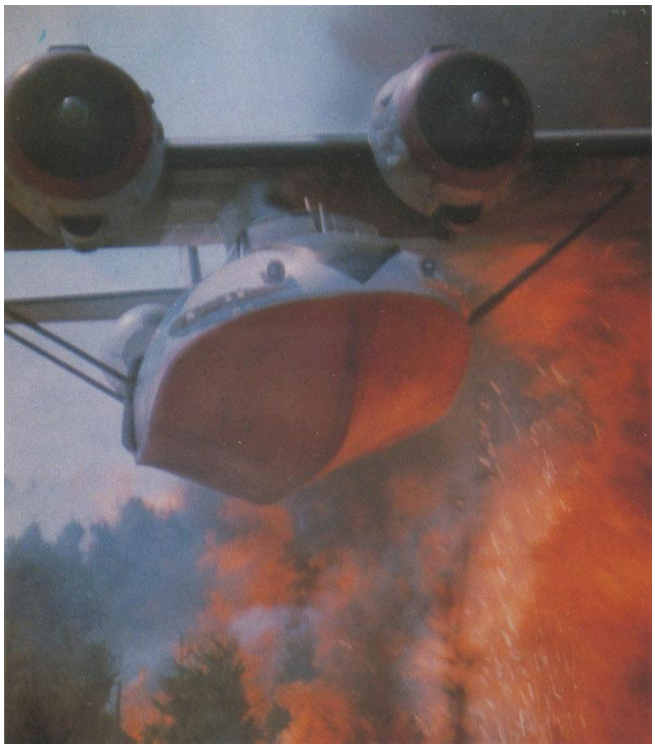
“The aircraft were pretty well defined in the script,” recalled model supervisor Michael Fulmer. “In fact, by the time we became involved, the production had already acquired the full-sized aircraft needed for the film.” Reference footage of the two key planes — an A-26 Invader and a PBY Super Catalina flying boat — was scrutinized by the model crew as they sought first to capture and then to replicate the feeling of flight. “Simulated flight is very tricky to achieve,” asserted Morris. “If something looks wrong while the plane is moving through the air, it telegraphs to the audience the fact that they are seeing an effect. So we had to study real flight footage in order to duplicate the subtlety of movement required to make our model work look real. If you watch an aircraft in flight, it exhibits a motion which lies somewhere between a straight line course and a gentle floating — that special way it has of moving in the wind, especially at slower speeds in prop-driven aircraft when their movement across the sky is more of a crabbing motion than a linear one. These airplanes are not rockets — theirs is an elegant motion through air which is not unlike movement through a liquid. In that sense, they are almost more like boats. Fortunately, a lot of the ILM people on this project were already familiar with what needed to be emulated. Joe Johnston, for example, had studied aircraft for a long time and is a licensed pilot as well. Even so, it still took us a while to get the flying down — especially on the nighttime wire rigs. The pilots among the crew were serving almost as puppeteers to get the subtleties across while keeping the movements correct.”

But getting the movements down was only part of what was needed to sell the model footage. Another important element was insuring that the models were moving at the same apparent speed as the actual aircraft. “The real planes would fly between one hundred and one hundred fifty miles per hour,” said Morris, “so we determined that in order to best be able to simulate correct mass and speed, we would build our planes in fifth-scale.” Accordingly, these miniatures would then be put through their paces at speeds ranging between twenty and thirty miles per hour in order to match their full-scale counterparts. This served to minimize the need for high-speed shooting as well, since relatively large-scale models create a sense of weight and presence which smaller miniatures do not. But the scale selected resulted in some tremendous sized models. For the Super Catalina — which wound up weighing one hundred fifty pounds — the wing-span alone measured a whopping twenty-one feet!

Adding considerably to design and engineering difficulties was the fact that the aircraft models needed to be built using nonstandard techniques because they were expected to operate as free-flying radio-controlled vehicles. Since it had been determined early on that the daylight scenes would be shot outdoors, the idea of using radio control seemed a good bet. The models would not have to be puppeteered and their natural aerodynamics would insure convincing movement of the planes on screen. Using radio control aircraft would also eliminate the troublesome business of having to hide the wires which would otherwise be used to suspend the models.

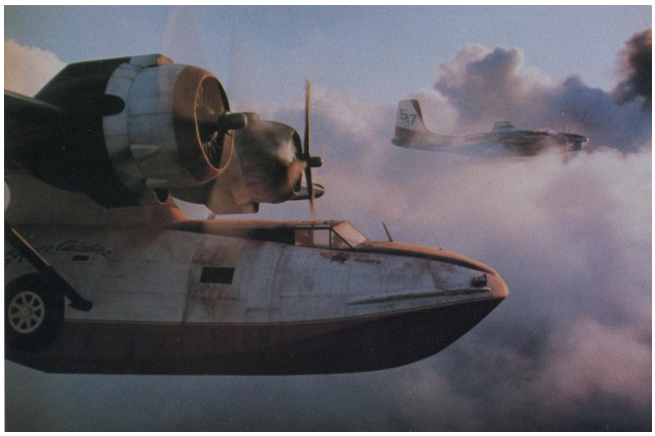
The decision to go with radio control had other ramifications, however. “When we finally did get the project,” Fulmer recalled, “there was not a whole lot of time in which to prepare. In fact, it was one of the shortest run-ups I can remember. We got the call sometime in late April, and we started shooting during the first part of June. So we had less than two months to design the models and get them ready to shoot at the steel plant which had been selected for our night

exteriors.” As those night sequences would utilize a wire rig to fly the planes, the radio control models were required to pull double duty. “One of the most challenging aspects of the whole operation was the fact that the aircraft had to be designed and built to accommodate those two very different criteria — they had to be able to operate as radio-controlled flying models as well as be adaptable for use on a wire rig. Each plane had to be built with the flexibility to function in both situations.” The size of the models tended to make the conversion process a difficult one. “The models had functional airfoils and would become neutrally buoyant at about twenty-five miles per hour. In other words, they would actually gain lift at that speed which would tend to make them porpoise at the end of the wire rig. Of course, that would have been a big problem. So we had to modify the flying model by weighing it down when we had it on the wire rig.”



A borate-laden PBY Super Catalina makes a low pass over a raging forest fire. To sustain a sense of realism against scale-busting flames, model aircraft employed in the action sequences were built uncharacteristically large. The Super Catalina had a wingspan of twenty-one feet and weighed in at one hundred pounds.

A combination of factors resulted in the decision to farm out the aircraft construction. “Time constraints and cost considerations led to our going outside the facility to have the models built. We have a great bunch of people who can build just about anything, but we really have never had occasion to do radio control models such as these in such a limited time frame. So we contacted an outside group — one which was fortunately located very close to us.” Custom R/C Aircraft — a specialty company owned and operated by George Miller — was contracted to supply the production with six A-26 Invader models and two PBY Super Catalinas. “They had never done film work before, so I went up there and supervised them directly, helping them with designs while making sure they had the proper materials on hand. Another concern we had was that while they had a relatively strong background in radio control, they had never built anything as big as what we needed. In fact, very few radio control aircraft models have ever been built on this scale, and twin-engine types of this size are extremely rare.”



For scenes requiring formation flying, the partially out-of-frame Super Catalina was attached at the right wing to the truck-mounted flying rig while the accompanying A-26 Invader— fully visible — was flown on wires from a mobile camera crane.

Hundreds of Christmas trees were set afire and then photographed from a speeding camera car to provide background plates for subsequent on-stage process work with the actors seated in cockpit mockups.

“Custom R/C Aircraft constructed the necessary molds and did the fiberglass work,” Morris noted. The fuselage was constructed primarily from fiberglass and foamcore while the spars and the wings were made of wood. Even so, the planes ranged in weight from a relatively light seventy-five-pound A-26 to something close to double that for the Catalina. But if you stop and consider the size of these things — some of which were as big as hang gliders — you begin to realize that they were indeed very lightweight.”

In all, hundreds of parts had to be custom machined for each aircraft. “George Miller’s crew did most of the primary engineering on the models,” Fulmer said. “They used specially modified chainsaw engines for power. Later on, though, we wound up beefing those up a little bit in our own shop.” The division of labor helped speed the project along. While Miller’s facility designed the special heavy-duty retractable landing gear needed for the A-26 model, it was the ILM machine shop that handled their actual construction. “We also had to do the electric motors, as well as engineer the working bomb doors for the A-26’s borate drop.” Once the first prototypes were delivered, the ILM crew started the detailing process. “All of the painting and fine detailing work was done at ILM. Then, when the first A-26 was finished, it got shipped off to the steel plant in San Francisco where the night sequences were filmed. At the same time that was

going on, we were trying to finish the radio control models which were going to be used for the daylight sequences."

Just prior to undergoing the final detailing work, the first radio control A-26 model was taken to Hamilton Air Force Base for a trial run. "We test flew the first Invader in the middle of June," Fulmer attested. "It was amazing to watch it roll down the runway and take off. This thing went roaring past us, head high, at seventy miles per hour while the landing gear was still retracting." The successful flight served to ease tensions concerning the viability of getting such large models airborne. "There had been no tests prior to this because there was no way to test it. If there had been any kind of a problem in the design, or if the airfoil had not been right, or if there had been a servo failure, we would have wound up losing the whole ballgame right there in the weeds." With the models finished and airworthy, it seemed that half the battle was already won.

But what the aircraft would have to fly through was another matter altogether. The screenplay called for numerous day and night shots, most of which would require both ground-based firefighters and flying aircraft to interact with tremendous forest fires. This made necessary the construction of two miniature forest sets — one to be shot outside under the sun and another to be used indoors for the night exteriors. It also meant that the model forest footage would have to intercut flawlessly with full-scale fire effects which were being engineered by physical effects supervisor Mike Wood.

On location in Montana, Wood created a series of terrific blazes through which actors and stuntmen were able to move with a remarkable degree of safety. Footage of the devastating fires in Yellowstone National Park the previous year was supplied by Amblin to serve as a reference for the forest inferno. "The reference footage gave us some general ideas," said Wood, "but we wound up having to create the impression of a much larger fire since the genuine footage was not anywhere near as exciting as what was needed or what we ended up giving them. The fire we did turned out to be pretty ferocious." To achieve the desired effect on location, Wood used a partially cleared area which had already been burned. "The main firefighting scenes primarily involved stuntmen, but used a full production crew as well. In order to safely accommodate all of those people, and since it would be impractical — and unsafe — to burn down full-size trees for each take and then have to replace them, we instead made forty-one nonflammable trees which we piped with propane. Some of those artificial trees stood as high as thirty-five feet when they were set up on location. We had several real trees rigged to burn as well."

Propane piping wound its way throughout, enabling the entire area to be set ablaze simultaneously. In all, Wood would use some fifteen thousand gallons of propane to create the effect of a major forest fire. Probably not since The Hellfighters — a John Wayne vehicle about oil well fires and the men who fight them — had such massive burnings been staged. "The U.S. Forestry Service came in," recalled Wood, "and they worked with our greensmen to put in additional branches which helped cover the piping. Then we would just light it up. We had camera people and stunt people moving through this fiery maze with logs falling nearby and rolling towards them." Safety was always at the forefront and every precaution was taken to insure that danger from the fires would be minimized, both on location in Montana and later

back at the studio. “When we did this work on the stage, we had the Culver City Fire Prevention Bureau on hand, and they were always very cooperative. Once they realized we knew what we were doing, they pretty much let us do what we needed to do. Out in Montana, we had an actual firefighting unit with us. They helped us to get the fires lit; and if anything had gotten out of hand, they would have been able to put it out. Fortunately, we never had anything major happen, so their primary duties were making sure everything was safe and secure after we wrapped at the end of each day’s shooting.”

Despite the spectacular footage produced by the live-action unit, it was acknowledged by all concerned that not everything could be achieved full-scale. An ILM crew of about fifty people — with Joe Johnston as unit director — would have to duplicate Mike Wood’s efforts on a slightly smaller scale. “Initially, I was contacted to be involved in the art direction,” Bill George recalled, “but since Joe Johnston is such an incredible artist and had already done all the boards, and since the aircraft designs were already locked in, the only real art direction remaining on this project involved overseeing set construction — which in this instance meant landscapes. There were two major portions of that — the interiors at the Bethlehem Steel plant and the location work which took place south of here.”

Daredevil pilot Pete Sandich (Richard Dreyfuss) makes a desperate attempt to rescue flying buddy Al Yackey (John Goodman) whose engine has caught fire and is about to explode. Miniature long shots and live-action closeups were intercut throughout the sequence.

The outdoor shoot required a location adjacent to a runway since a staging area would be needed for the radio control take-offs. This limited the location possibilities considerably. “We found an abandoned airstrip near Tracy,” Morris recalled. “It was an old Navy strip. We ended up using it for the remote control planes, as well as for our ultralight aircraft.” The ultralights would figure prominently in attempts to film the radio control craft air-to-air, as well as providing aerial point-of-view shots from both above and within the model forest. “On one side of the airstrip we created our forest set. This we did by first landscaping the ground and then rigging it for our fire gags.”

Scenes showing actors at the controls were achieved on stage with full-size aircraft sections on hydraulic gimbal mounts positioned in front of

Construction of the forest was a grueling affair. “We built a huge set,” said George. “It must have been five hundred feet long and three hundred feet wide. Then — to better match the look of the

first unit footage we were getting — we had a bulldozer come in to dig some ravines in it. While all this was going on, it got to be about a hundred and two degrees outside during the afternoons. Thank God we had a pool back at the hotel.” Numerous Christmas trees, varying in size from six to ten feet, were installed in the forest set to represent the mammoth Montana woodlands.

rear process screens. To supplement the projected background footage, giant fans were employed to blow smoke and burning embers past the gyrating aircraft. A camera crew records John Goodman inside the Super Catalina.

Closeups of Richard Dreyfuss were achieved in a similarly rigged replica of the Invader. Stage effects were orchestrated by physical effects supervisor Mike Wood.

For repeatability and control, propane gas was again chosen for the flame effects. “There were big tanks of propane connected to what seemed like miles of plumbing that ran underneath the set,” said Fulmer. “When it came time to shoot the scene, the propane could be ignited simultaneously at all points throughout the forest.” But even small brush fires can prove to be rather hazardous; and despite the many safety measures taken, matters would sometimes get out of hand. “When you’re trying to work while there’s smoke all over, it’s hard to see and it’s hard to hear. And since what we had was a real forest fire, things got pretty hairy on occasion. We had guys in special flame resistant suits who were running around with fire retardant materials, trying to control the burn while our crew was shooting it. But sometimes the wind would blow the wrong way and we would lose it and the whole set would burn down. Before retakes, we would then have to go in and remove all the dead material and replace it with new trees. That proved to be a rather tedious and time-consuming procedure.”

In addition to the large-scale miniature forest, a number of trees were constructed with special breakaway tops for a scene early in the picture when Pete — out of fuel and trying to dead-stick his way back to base — skims over and through the trees en route to his last safe touchdown. Scenes where the plane gets in too close and hits the treetops were done in miniature on the Tracy forest set and then intercut with some remarkably convincing main unit rear process setups involving actors in aircraft mockups suspended on hydraulic gimbals. The mockups themselves were tremendous in size, and three specially built gimbals — each custom made for a particular plane — were required to simulate a full range of flying maneuvers.

“We had about two-thirds of the full-size A-26 Invader on a hydraulic gimbal,” Mike Wood stated. “To make it easier to shoot the thing, we shortened up the wings and tail considerably by using forced perspective. Even so, the wingspan came to about seventy feet across. Those shortened sections were made out of wood, then skinned and turned over to the paint department. Thin basswood was used to form the necessary contours. The fuselage section came straight from an actual A-26, and did not need any modification. We also had part of a PBY on a gimbal. In addition to foreshortening the wings, the PBY fuselage required a lot of modifications.”

For maximum flexibility in shooting the mockups, full cockpit interiors were mandated. “All of the gauges and instruments inside the aircraft had to work as if they were real. The altimeter, the airspeed indicators and all the rest of the instrumentation was fully functional.” Coordinating the rear-screen projections with matching foreground flame and smoke effects was a major undertaking overseen by special effects foreman Mike Edmonson. “For shots which called for burning embers to fly past the cockpit, actual embers were lit and then pushed through air movers to speed them past the gimbal-mounted mockup. The air movers were

needed to simulate the speed of the planes as they fly through the fire. For certain cloud and smoke effects which were seen reflected in the canopy of the mockup, we used liquid nitrogen and a water-based fogger system. Large wind machines were then employed to make the clouds and smoke stream past the cockpit."

Even more elaborate measures were needed during the sequence in which Al's aircraft begins to catch fire. "We had to deal with the sparks and embers here as well," said Wood, "but additionally, we had to light his engine on fire. We had hydraulic motors making the props turn; and we rigged the engine with propane so that we could give the impression that it was burning, while doing so in a way that would be both safe and repeatable." Safety was most definitely a concern as the actors in the cockpit mockups would be spending considerable amounts of time suspended above the stage floor. For their comfort — and reassurance — the cockpit interiors were air conditioned and had fire safety equipment located within easy reach.

Director of photography Mikael Salomon contributed heavily to the success of the cockpit shooting. "Mikael had just come from working on The Abyss," Jim Morris observed, "and he was able to apply some of the new rear-projection techniques he had mastered while working with James Cameron on that. The experience certainly helped him do a lot of terrific work on Always." One of his most significant accomplishments was the realistic simulation of sunlight in the cockpit shots. "Any shot where you had Richard Dreyfuss, John Goodman or Holly Hunter in a cockpit used rear projection and a mockup at the studio. Mikael had the key light on top of a big crane so that as the plane flew along — doing its little turns and so forth — the light would be moving around to create the impression that the sun's position was changing relative to the aircraft."

Flames lick at the underbelly of the A-26 as novice flyer Dorinda Durston (Holly Hunter) attempts a dangerous low-level night mission to clear an escape route for a team of ground-based firefighters trapped by the inferno.

Unlike the daytime shots which were accomplished outdoors, the night flying scenes were staged inside an abandoned steel plant where maximum control could be exercised throughout In a succession of shots — many recorded from moving vehicles — the fifth-scale model aircraft was flown on wires past all or parts of a blazing miniature forest nearly four hundred feet long.

"A lot of time and research went into the lighting of those mockups," Wood recalled. "For some shots, Mikael had the camera suspended from a crane; and while the rear projection was going, he would project a similar plate onto the plane to produce an interplay of fire in the background plate with corresponding light effects going on in the foreground." Some of the tamer rear projection material came from the previous year's Yellowstone blaze, while the more extreme and violent burning shots were supplied by ILM from their location shoot.

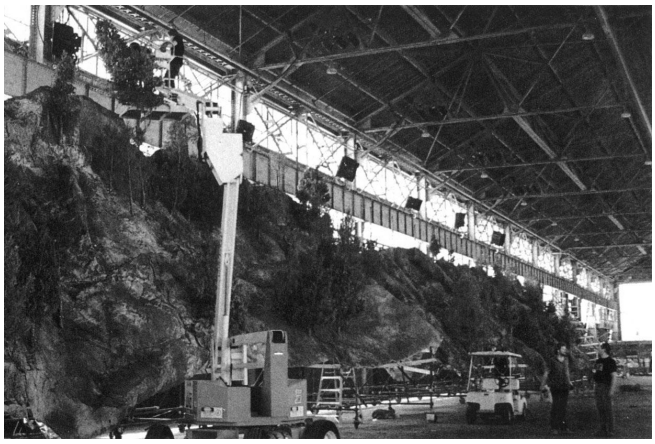
Despite the promising test flights, use of the radio control aircraft models proved troublesome. “Certain problems became apparent when we were on location,” Morris noted. “While the models did function, there were a lot of problems inherent in their use. For one thing, the aircraft would fly so fast that it became very difficult for the camera operators to follow the action.” Alternate approaches were considered. “We tried shooting air-to-air with an ultralight aircraft,” stated Fulmer. “That bordered on severe humor. What we found out was that you can’t chase a radio control aircraft with an ultralight — not with any degree of harmony anyway.” The only other option for air-to-air shooting — flying a helicopter in close proximity to the models — was deemed too dangerous to even consider.

Wind conditions on location were also a frequent problem, causing the models to be grounded on some occasions and creating havoc for controllers on others. “In most of the instances where radio control aircraft have been filmed in the past,” said Fulmer, “use has been limited to extreme-long-shot, ground-to-air photography as in The Battle of Britain. But the technique had never been used before in this kind of a situation. We had to fly through viscous clouds of heavy smoke to simulate not only the fire, but also actual cloud cover. The smoke blown by the Ritter fans drifted for miles and ended up covering practically the entire Tracy valley. This made things very difficult and dangerous for the camera crews. The radio control operator needed to maintain visual orientation at all times; and under these conditions, it just was not possible. When the plane disappeared into that smoke, the operator would lose sight of it and then anything might happen. The problem is that when you try to control it with a toggle — from afar — you cannot feel the aircraft. One would think that by holding the controls steady, the plane would go in one end of the cloud and out the other right on the mark, but instead we found that it could just as well exit heading straight up, straight down or even upside down.” Some mechanical failures contributed to the overall anxiety. “There was just no time to do any research and development; and when all it takes is a snapped twenty-five-cent part and your aircraft is destroyed, things can get pretty nerve-wracking. The crews had to deal with extremely hot weather, malfunctioning parts, heavy smoke and the occasional rough landing. All things considered, it’s really mind boggling that they got the radio control models flying at all.”

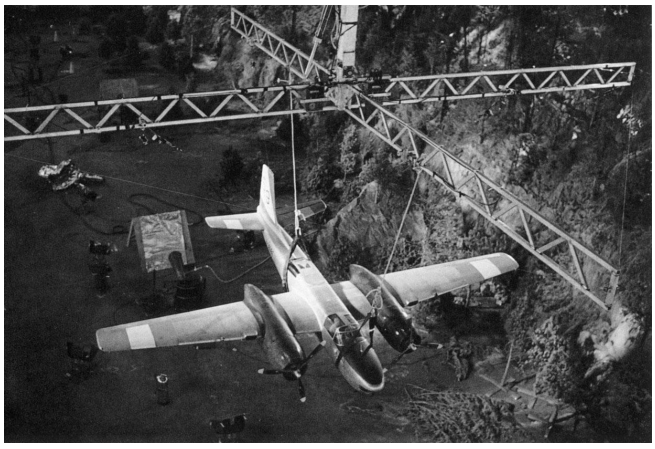
“Lighting conditions were often a problem as well,” Morris recalled. “In the end, we had to just chuck the radio control stuff altogether.” Abandonment of the radio control approach in midstream meant that another gameplan had to be put into play — and quickly. The technique chosen was very much like that pioneered in the Thirties and Forties by the Lydecker brothers — Howard and Theodore — who flew large-scale models on wires in dozens of serials and World War II films. “Key grip Dick Dova worked together with our key rigger, Dave Heron, to create a long Roan truss jib arm which was affixed to a flatbed truck. The cantilevered arm was able to extend as far out as seventy-five feet from the truck, and on the end we could mount our Vistavision camera for aerial point-of-view shots or suspend an aircraft model on wires.” In true Lydecker fashion, the aircraft had wire mounting points on the fuselage and the tail, and on both wings as well. This afforded maximum control and steadiness during aerial maneuvers. At the top of the crane, attached to each wire’s support, were shaker devices used to vibrate the wires, blurring them into invisibility for the cameras that were often mounted on special cars to follow the action.

But the aerial rig was not the only means utilized to get footage of the aircraft models. “There were a number of shots of the PBY,” Fulmer noted, “both before it catches fire and after the fire has been extinguished, where you are looking down on it as it cruises over the clouds. To get that view, the model was mounted three to four feet off the ground. We would then fire up our foggers to create huge plumes of smoke which the Ritter fans would push under the plane. Looking downward from behind, the aircraft appeared to be flying over the clouds because the thick smoke was like a treadmill moving beneath the stationary model.” Since the foggers normally produced only white smoke, pyrotechnician Bob Finley II was called upon to chemically provide the desired yellow cast.

It was the outdoor wire rig, however, that would see the most action in the weeks to come. In addition to enabling forest overflights by both aircraft, it would figure prominently in a key sequence involving both aircraft together in the same frame — with one on fire, no less — and an elaborately staged chemical drop from the A-26’s underbelly. In the PBY, Al has labored unsuccessfully to extinguish his engine fire. He seems resigned to his fate. But Pete — disregarding the urgent warning of a ground observer — puts his A-26 into a steep dive intending to pass closely above the PBY and extinguish the blaze with his load of borate. “The PBY was in the foreground,” Morris recalled, “so we were able to set up the shot in such a way that the right wing was attached to our camera truck by a fixed mount. Then we framed the shot to insure that the mount would remain unseen.” for the A-26, however, which had to gain on the PBY as the shot progressed, a different rigging approach was required. “When the A-26 comes in over the top of the Catalina,” said Fulmer, “it is hanging on wires from our mobile camera crane which we really got moving along at a pretty good clip. Razor-sharp timing — along with some sharp puppeteering — was needed to get that thing in really close and also get the fire retardant material to drop right on target.”



Stage crews prepare the forest set for photography. Over a substructure of steel pipe and lumber, a hillside of wire mesh was fabricated and blanketed with heavy foil that was painted and then textured with dirt and vermiculite. Christmas trees were inserted into a network of tubes and propane lines were piped throughout.



A gantry was constructed above the set and from it was suspended a computer-controlled marionette rig that allowed the model aircraft to bank and crab and pitch while traversing the run at speeds up to thirty miles per hour.

As was the case in almost all instances requiring controllable fire effects, the PBY engine burn was propane fed and augmented with smoke gags. “There were numerous retakes,” Fulmer noted,

“most of which required redressing and relighting — over and over again.” In the finished film, the A-26 seems to pass a mere hairsbreadth above the burning PBY while simultaneously extinguishing its blazing engine with a borate drop at point blank range. The borate drop was accomplished — oddly enough — using genuine fire retardant to smother the fire. “Initially we tried a lot of different things,” Morris recalled, “but by mixing the retardant with microballoons, we managed to give it a somewhat lighter feel that seemed to look just about right. All the shots that we did involving the drop of fire retardant used actual Monsanto retardant.”

While it would seem that using full-scale borate with the fifth-scale models would present compatibility problems, this did not in fact prove to be the case. “Normally,” Fulmer revealed, “borate needs to be saturated with water prior to use, but that was not necessary for our purposes. In dry form, borate is a very fine powder which worked well in maintaining scale. For the actual shot, they were able to time it so that the borate could be dropped from the A-26 right onto the PBY as the smaller craft went over the fixed model. There was a grip on the back controlling the drop with a lever mechanism.”

With the fire in his engine now extinguished, Al slumps back in relief. But the action is far from over. “After Pete has extinguished Al’s burning engine,” Morris recalled, “his A-26 disappears into the smoke below. At this point, you cannot tell what has happened to him. Al looks down, and you get a shot from his point-of-view of fire coming up under the rolling black smoke and it looks really bad for Pete. To get this view, we used an ultralight aircraft to overfly the forest set. It was a two-man model which we modified somewhat to get it to hold a Vistavision camera.” Ultralight footage was also used later to provide rear projection backgrounds for the cockpit process work.

After a treetop-skimming recovery from his perilous dive, Pete stuns Al by managing to emerge — apparently unscathed — from within the smoke clouds. The two planes take up formation together, flying side-by-side, and it is only then that Pete discovers that his engine is now on fire. As Al looks on in horror, his friend’s plane explodes in midair. The aircraft’s fiery demise was handled back at ILM. Rather than superimpose stock explosions over the A-26 — a common approach to such scenes — the decision was made to actually rig a model with pyrotechnics and blow it up. “The stage crew had the model — one of our original radio control shells — suspended from a crane,” Bill George explained. “There were two cameras which were covering it — one in long shot and the other close up. During the take, both cameras were shaken by stagehands to give the impression of air turbulence. The move they did — in toward the model just as it blows up — was very nice.”

With the exterior daylight footage in the can, the Tracy shoot was pretty much over — a fact that was greeted with considerable relief by the crew. “It was one hundred and five degrees out there,” Jim Morris said. “That fact — coupled with the long hours of hard work — took an awful lot out of our people. It was just fortunate for us that we had such a strong rigging crew and that they were able to switch gears as quickly as they did when the radio control approach was dropped.”

After his airplane explodes, Pete discovers to his amazement that there is life — of sorts, anyway — after death. An angel (Audrey Hepburn) informs him that back on earth six months

have passed and that it is now his duty to return in spirit and provide inspiration to an inept but well-intentioned pilot named Ted Baker (Brad Johnson). Staying with his charge — who is oblivious to his presence and influence — Pete eventually helps the young flier get accepted for training in an aerial firefighting school which Al Yackey is now running. One humorous scene in which Ted — while practicing his approaches — accidentally drops his borate load right on Al was arranged by real firefighters who staged a live drop on location.

While at the school, Ted becomes involved with Dorinda and Pete is forced to deal with the fact that he must let go of the past and allow Dorinda to live her life. When a major forest fire rages out of control, Ted volunteers to go on a near-impossible night mission to rescue a group of firemen from a blaze which threatens to engulf them. Unwilling to let another man she loves be lost to the fires, Dorinda takes Ted's place in the A-26. Knowing that Dorinda will be in need of inspiration and guidance, Pete accompanies her on the desperate flight hoping to give her the necessary subconscious instructions she will need to negotiate the treacherous low-level route.

For these night scenes, a somewhat different approach was adopted — indoor wire work. "While we had hoped to do the day exteriors using radio control," Fulmer explained, "we knew going in that the night flying would need to be shot with the utmost control. Working indoors gives you that. Another reason was because we would naturally have been limited to shooting only at night if we were outdoors. Since we needed the darkness of a completely enclosed space — and for ease of lighting — it made more sense to work indoors on a dark stage that we could light selectively until it looked perfect. Then we could go in and shoot all day long."

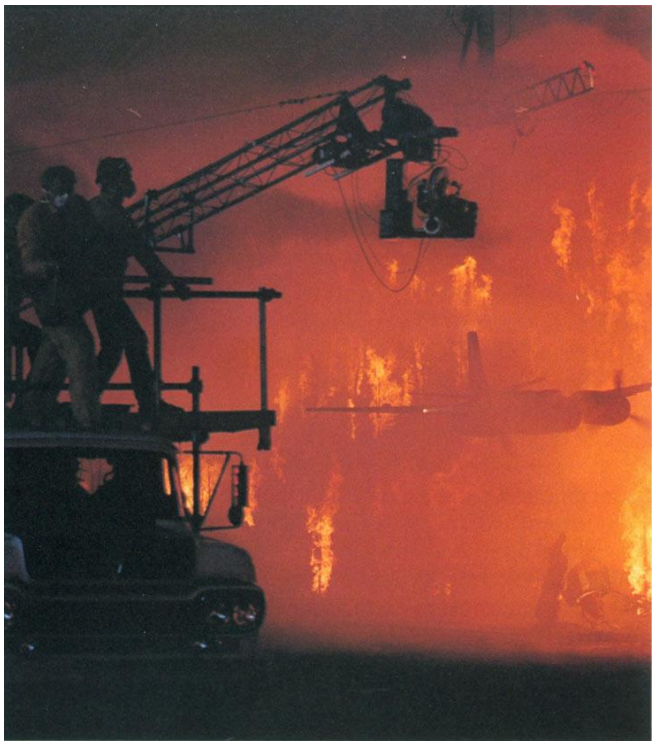
The Bethlehem Steel plant in nearby San Francisco was just the place. More than five hundred feet long and about seventy feet from floor to ceiling, the vacant building — which had been used in an earlier remake as the main pod growing facility in Invasion of the Body Snatchers — was large enough to house the massive forest set and sturdy enough to withstand the searing temperatures of the expected conflagration. "After taking over this abandoned steel factory," Morris related, "we went in and built a gantry rig. Affixed to the ceiling was a track system which Dave Heron used for wire hanging, but this one had much greater flexibility than the one that was used for the day exteriors. This unit allowed the aircraft to pitch and yaw, to crab ten feet over and to boom up eight to ten feet — all while still going forward at thirty miles per hour."

"Essentially it was a marionette rig," Bill George elaborated, "and it would fly down the entire length of the set as it executed its maneuvers. To operate the rig, there was a computerized control mechanism that could create a bank, a lean or a tilt, as well as direct the whole mechanism to scissor upward like a tire jack. We would use it for hanging either the model plane or our big Vistavision camera which was used to get POV shots of the plane's passage down the trench. It was scary because the whole thing was so heavy. To support the wire rig, huge steel I-beams were mounted to the roof supports — very long ones because we wanted to avoid seams and joins that might create bumpiness as the rig moved down the track."

Coordinating the aircraft's movements required a team effort. "Four men stood on a catwalk," Fulmer explained, "and they served as pilots for the rig's various functions. These guys actually

flew this thing along while, in most instances, the camera car would be following the action from either beneath the rig or alongside it.”

Since the A-26 had to be shown flying over and through a vast expanse of burning trees, it was necessary that the set be reconfigurable to represent different areas of the forest and also permit the aircraft and aerial rig to move through it at speed. Additionally, the set would have to be rendered capable of bursting into flames at a moment’s notice. “Jeff Olson headed up the construction team that built the hillside,” George noted. “He had to keep in mind that it was going to catch on fire, so a lot of the materials used in construction were dictated by that fact. The basic substructure was made from two-inch steel pipe. Over that we laid fire-treated one-by-fours which were wired to the pipe. The result was a big steel and wood mesh screen that was shaped something like a trench. On top of that we put a thick-gauge foil which was first painted and then textured with dirt and vermiculite.” The set sloped up and back from the ground at a forty-five-degree angle which helped give the impression of greater depth to the forest.

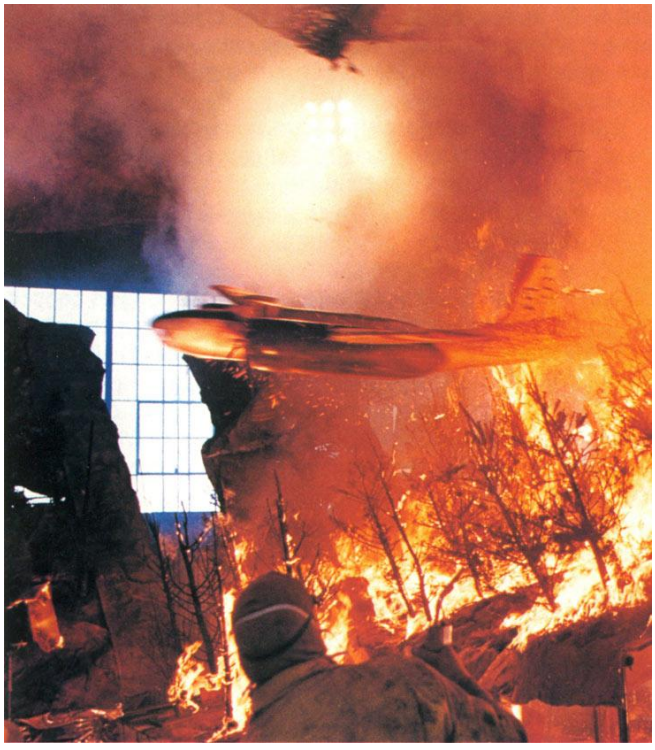


A remotely operated camera records the action as the model Invader makes a low-level pass through the blazing miniature forest

As was the case on the Tracy shoot, various sized Christmas trees were used as stand-ins for their much larger forest counterparts. “We had to do a little bit of trimming on them to make them match up better with the trees that were seen in the main unit shoot,” said Morris. “Within the main structure of the forest set, there was a framework of steel tubes into which we planted these trees. We would wire the trees to a steel bar and then insert the bar into one of the steel tubes on the hill. The whole system was very modular. After a take, we could get up into a manlift and just pull the charred and burned remains out, then put fresh trees in their places.” To suggest that the action was transpiring over different areas of the forest, additional set pieces were required. “Behind the main set,” said George, “we had what we called ‘wings’ — which were just big wedge shapes with trees on them. We were able to position those in such a way as to make the set appear different from shot to shot, and to make it seem as though it went on a lot further than it actually did.”

With the aircraft suspended overhead, crew member Jeffrey Olson works to repair the set between shots. Although the propane could be turned off at will stagehands were kept busy trying to prevent secondary fires from raging out of control. Often it was necessary to go in and replace burned out trees with new ones.

Flame effects in the set had to extend from two hundred to four hundred feet in one unbroken stretch. “We had miles of tubing in the back of the set to deliver propane gas to the front where the action was taking place,” George recalled. “It was completely crazy and very frightening.” Jim Morris shared the same impression. “Even with all the precautions taken and all the fire control we had on hand, when you saw those giant aircraft models whipping hundreds of feet across the burning stage, it was scary — just a helluva sight.”



After an initial drop which fails to extinguish the blaze, Dorinda again descends below treetop level to make another pass. This time she is successful in dousing the flames, thus creating a path through which the besieged firefighters below can make good their escape. “We did everything in-camera for the two passes Holly Hunter makes,” Fulmer commented. “That was all designed to be

done on the wire rig; but as this was before we had the unsuccessful radio control experience in Tracy, we were using the actual remote control models. In order to convert them for the wire rig, we took the engines out and put electric motors in their places. These motors could turn the props without actually pulling the model along like the working engines would. But the various functions built into the model — such as the bomb doors for the borate drop — were still operated by radio control.” As was the case during the Tracy shoot, real borate was used for both drops made by the miniature A-26.

Project manager Ed Hirsh coordinated the requirements for each shot. Precise cues had to be supplied to the remote pilots controlling the aircraft, as well as to the camera crew and the pyrotechnicians waiting to set the forest ablaze. Timing was crucial. “Once we had the Bethlehem Steel plant fired up,” Fulmer explained, “there was smoke and fire everywhere. The aircraft had to fly from one end of the set to the other and we did not have very long to get all our shooting done. Once the propane was ignited, the Christmas trees would burn right down in no time at all.”

While the trees were burning down, other things were falling down. Occasionally there was model damage when wires suspending the A-26 would break during a shot. Even the building itself was full of surprises. “There was an old sprinkler system installed in the ceiling,” said George, “and during one stretch of a couple of days when we had the whole set burning, it got so hot in there that all of the little sprinkler head triggers popped out and fell on our heads. For a moment, I thought the whole building was coming down on us.” The plant’s high ceiling also drew a host of unwelcome visitors. “The building was huge and pigeons would come in and roost up top. Smoke would go up there and birds would be falling left and right. Whenever we could, we would take them outside and try to give them some fresh air, but a lot of them died.” Fire safety personnel were always on hand during the shoot, and the San Francisco Fire Department stood ready to help out if needed. But everything went as planned. No longer subject to the vagaries of variable winds and lighting conditions which plagued them on location at Tracy, the ILM effects unit completed its interior night shots smoothly and with dispatch.

Aerial sequence designer Joe Johnston — who also directed the miniature flying unit — aligns his camera on a reflection of the Invader aircraft. High-speed approach shots that might have endangered the camera or its operator were accomplished safely with mirrors. Numerical designators and aircraft lettering had to be reversed on such shots for them to read correctly

in the mirror. All of the miniature flying scenes — sixty-some shots — were completed wholly in-camera and required no optical compositing or enhancement.

Visual effects supervisor Bruce Nicholson was responsible for executing the few conventional optical shots needed. “There was an establishing shot of the A-26 as it descends toward the nighttime forest fire,” Fulmer noted. “We did that shot bluescreen, and the model was later matted into a panoramic vista that showed the full extent of the fire. We used composite elements — motion control aircraft and a one-twentieth-scale set of the valley.” After successfully laying down a flame-free zone for the imperiled firefighters below, Dorinda pulls back on the stick and her A-26 climbs swiftly above the clouds and into a clear and starry sky. “She goes through a canyon of clouds. It was a stage set we did at ILM, with the clouds done practically and the sky put in as a separate matte painting element.”

Initially the sequence was to have been much more stylized. “The idea had been that she went into hell to rescue those people,” George revealed, “and then, after her success, she heads up past the clouds to a point where it is almost like heaven. Her plane goes sailing up toward the stars where it is cool and it is quiet and it serves as a sharp contrast to what she has just been through.” After some early previews, however, Steven Spielberg decided to have the shots redone in a more naturalistic fashion. One shot sent the crew back outdoors. “The A-26 had to make a big arc in the night sky,” said Morris. “This shot could not be accomplished on our linear track, so we used the Roan truss crane arm which was able to swing the plane around in a circular motion. Since we did not have room to use the crane inside, we went outside one night and shot in the parking lot.”

After a brief respite above the clouds, the A-26 plummets earthward. Guided by Pete’s presence, Dorinda manages to keep her craft level and succeeds in ditching the disabled plane in a nearby lake where it sinks immediately to the bottom. For the pilots-eye view of the splash landing, a setup was employed which recalled a similar moment in Alfred Hitchcock’s Foreign Correspondent A rear process screen was mounted in front of the cockpit mockup and onto it was projected a plate taken from an aircraft skimming over a lake surface. A quick tilt-down had been done at the end of the pass — and at that exact moment during the stage shoot, a reservoir of water was dumped into the mockup to simulate impact.

For a subsequent underwater view as the aircraft touches bottom, one of the A-26 models had to be slightly modified. “The wood and foamcore elements were replaced with fiberglass,” said Morris. “Additionally, we incorporated into the plane a plumbing system with specially designed manifolds which released tiny bubbles to maintain the scale of the model.” The model shop crew used sand to fashion a simulated lake bottom and then lowered the completed set into a swimming pool. Underwater cameraman Pete Romano — an ILM alumnus with credits on such films as Star Trek IV and The Abyss—photographed the scene.

To accomplish the live-action shots needed inside the flooding cockpit, the effects crew first built a large aquarium. “It was on a gimbal to accommodate the various movements that were needed,” Mike Wood recalled. “We had air bubblers in there, as well as two huge pumps which allowed us to either fill or drain the aquarium as needed. We then built the cockpit — which was a duplicate of the one used for the rear projection work — into the aquarium.” Once complete

and filled, the aquarium served as a window through which the camera crew was able to record the underwater action without getting its feet wet. The shooting went off without a hitch.

Unable to extricate herself from the downed aircraft, Dorinda seems doomed. But miraculously, Pete is able to make himself appear to her. Extending his hand, he takes hers and magically lifts her from the plane and guides her toward the surface. Stunt personnel were used for the upward swim which was photographed in a tank at Universal. When Dorinda makes it to the surface, she is no longer able to see Pete or touch him — but in spirit he remains at her side. He accompanies her back to the airfield where she is happily reunited with Ted and sets about getting on with her life. His mission accomplished, Pete is now prepared to accept his destiny. As the film draws to a close, he simply turns and walks off down the runway.

The original ending was not so prosaic. “Steven had wanted Pete to start walking,” said Morris, “and then suddenly begin to rise into the night sky as if being lifted up to heaven. We did a shot of Richard Dreyfuss in front of a bluescreen to achieve that effect.” But once again, after previews, Spielberg nixed the fanciful element and the invisible stairway to heaven was out. But there was now a problem. “Steven did not have a shot of Dreyfuss just walking away. But we had this bluescreen element of him, plus we had the background plate, so we wound up doing the end shot as a composite. It certainly was not planned that way, but it worked out in the production scheme and that was what wound up being used.”

The overall approach to shooting effects in-camera for Always was so successful that the animation department — a mainstay of most effects productions — was not needed either to sweeten or salvage any of the flying shots. Everything — including reflections on the aircraft as they pass through the blaze — was genuine. “Most of our work was done in-camera using four-perf,” Jim Morris concluded, “and was thus able to go straight to the editing room. The miniature footage, the main unit ground shoot and the flying shots of the real full-scale aircraft all cut together just fine. As a result, even though we did between sixty-five and seventy shots altogether, this show does not look like an effects picture. The only traditional animation included in the final cut is a lightning bolt supplied by Gordon Baker for a storm sequence in the middle of the film.”

Always was a notable change of pace for most of the ILM regulars. “My background is mostly as what you might call a desktop modelmaker and art director type,” said Bill George, “so getting the opportunity to go out and work on these huge things that would catch fire and burn to the ground was something new. We were working long hours, and it was hard labor. Physically and mentally, the experience was an exhausting one. But it was fun, too.”

“What was really interesting about Always,” reflected Mike Fulmer, “was that a lot of this kind of flying stuff has not really been done since the Lydecker brothers — and even they never got as close to the models as we did. Flying through smoke and fire is very difficult to accomplish believably, but in this instance it worked out pretty well.” Though frustrated by the lack of success in getting usable footage of radio control aircraft in action, Fulmer nonetheless remains optimistic about future applications. “Probably the true potential lies in being able to film these things air-to-air using another radio control aircraft as a camera plane. A video tap could be rigged that would allow the operator to watch on a monitor from the ground while at the same

time directing the camera plane. As it turned out on this particular film, there were not that many shots which required air-to-air. But if you were doing a World War II piece and wanted to do a full aerial combat sequence, you might not be able to get ahold of any of the existing original aircraft. With radio control you could do some wonderful stuff if you used the right camera speeds and the right lenses — and nobody would be able to tell it from the real thing."

Which, of course, is what it is all about.

Always photographs copyright © 1989 by Universal City Studios, Inc. All rights reserved. Production unit still photography by John Shannon. Effects unit still photography by Kerry Nordquist, Sean Casey and David Owen. Special thanks to Lisa Van Cleef and Frank Rodriguez.